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ESSAYS AND CASES.

Art. I.—Relations between the Food and Flesh of Animals.

Facts relative to the Influence of Variations of Food on the qualities of the Flesh and Fluids of Animals. By the Editor.

During the past winter, the discussions in the Cincinnati Medical Society, took the course of solidism and humoralism, and excited so much interest, that the Editor has resolved on publishing in the Journal, one of his lectures on the *Materia Alimentaria*, delivered in Transylvania University, November, 1823. Being shortly afterwards transferred from the chair of *Materia Medica* to the *Practice of Medicine*, he did not enlarge and perfect this lecture; and does not now regard it as of deep interest, for many of the facts will be familiar to most of his readers. Still, it may, perhaps, be found equal in point of utility, to many of the matters which find a place in the Journals of the day.

It is well known, that the flesh of animals of different species, varies exceedingly in its qualities, and no doubt their blood and other fluids differ in an equal degree. These variations among different tribes, compared with each other, are in harmony with those anatomical and physiological differences, which constitute them into distinct species. It is not my design, to inquire into the influence which the diet of each species exerts on the qualities of its flesh, compared with other animals, but into the effects on individuals, compared with other individuals of the same species, of departures from their natural aliment. These effects are unquestionable, but their limits are not very extended; for there is a *vis conservatrix naturæ*, in every living system, which is directed to the maintenance of a uniform condition. How far it succeeds, under great variations of diet, drink, and condiments, can only be determined by observation and experiment. Relying then upon facts, rather than *a priori* reasonings, I shall proceed to enumerate such as have presented themselves to me in a moderate course of inquiry, dividing them into several distinct heads.

I. Of the modifications which have been observed in the fluids, from subjecting animals to the ingestion of particular substances.

1. *Of the Chyle.*—Dr. Marcet analyzed the chyle of dogs subjected, successively, to a diet purely vegetable and purely animal. The chyle from vegetables kept for several weeks without putrefying—and contained a great deal of carbon. The chyle from animal food putrefied in a few days; it had a layer of oil swimming on it like cream which the other had not; it abounded in ammonia to a much greater degree than the other, and contained but a third part as much carbon. (Orfila. Chem. Anim. vol. 2, p. 403.)

Dr. Johnson (Animal Chemistry, vol. 1, p. 212) observes—"A great many substances enter the lacteals along with the chyle, even solids reduced to a fine powder. When Indigo has been thrown into the intestine of a sheep, Dr. Fordyce

has seen the chyle rendered quite blue; yet indigo is not soluble in water, but is a solid reduced to fine powder. Musk likewise gets into the chyle, giving it a strong smell, and a great variety of other substances of various colors, various tastes, and various smells, each of them giving color, taste, or smell to the chyle."

Magendie (Phys'y. p. 378) asserts that the chyle of dogs fed exclusively on gum or sugar, becomes transparent and watery.

2. *Of the Milk.*—Modifications of the milk of woman and the mammaliæ, have been observed to follow the use of certain kinds of aliments. In reference to woman, it has been said, that, disordering her health, they disturb the mammary secretion; and thus, render her milk unhealthy. It cannot be doubted, that every departure from a sound physiological state in the nurse, is attended with some variation in the quality of her milk; but to ascribe all the effects of different kinds of food and drinks on her milk, to that cause, is to disregard the numerous facts, which observations on the lower animals have accumulated. Let us review some of these, beginning with those which relate to the milk and butter of the cow.

Dr. Young, in his Course of Experimental Agriculture, vol. 4, p. 370, states, that he had a cow fed totally on turnips, and that her cream tasted strong, and the butter was excessively bad.

Johnson (Anim. Chem., vol. 1, p. 138–9) states, that "all plants of the garlic kind, many of the umbelliferous, the horse mint, cabbages, turnips, and different kinds of autumnal leaves, give to the milk of the cow a peculiar flavor. Cows, continues he, fed on the leaves of maize, give an extremely mild and saccharine milk: those fed on the potatoe, an insipid milk."

Dr. Gardner adds, he has found, that after cows eat indigo, in the indigo fields, the cream of their milk is of a beautiful blue color. Cows that eat madder, he adds, give a milk that appears streaked with blood, and those which feed on the fruit of the cactus opuntia afford milk of a reddish color.

It was asserted by Professor Barton, in his Lectures, that all the plants of the class Tetradynamia impart peculiar qualities to the milk.

Another authority, of the highest credibility, is Parmentier, who holds the following language: "If the savor of milk," says he, "(independently of the peculiar nature of the animal,) be owing to the re-union of the different principles, that constitute this fluid; it is not less true, that these principles receive, on the part of vegetables, characters which are in some sort indelible. If plants contain, for example, mucus (mucilage) in abundance, the milk will give a great deal of caseous matter, (they both contain azote,) and its savor will be insipid or sweet. If, on the contrary, they are aromatic, the butter will be sapid from the affinity of the *esprit recteur* with the oily matter. In the same manner, the milk will be colored if the plants contain a coloring matter, soluble in one of the principles; and it will abound in whey or serum, if the plants contain much humidity. In short, all the products will be more fine, more solid, and more perfect, according to the tenuity of the oily, mucilaginous substances, and to the coriaceous, hard, and fibrous state of the plants, which concur in their formation. This being admitted, it is easy to see why the most perfect butter, and the most esteemed cheeses are made from milk of cattle nourished in meadows, where many odoriferous plants grow; and when these meadows have lost, by exsiccation, their perfume and their superabundant humidity, they give a less delicate and more firm butter; while cows furnished simply with the stalk and leaves of maize, give always a sweet milk and insipid and firm butter, on account of the insolubility of the saccharine body in the butter, of the absence of the aromatic part, and of the solidity of the vegetable. It will farther explain why the milk of the cow, fed with potatoe tops, which are more aqueous than maize, gives equally an insipid butter, but of a less firm consistence; why the cruciform plants communicate a strong taste to butter, while the whey is almost insipid; in short, why cows, that feed in moist places, give milk less rich than those feeding on

high and open pastures. If, therefore, we wish to make the butter and cheese of cows fed in the first pasture, more perfect, some aromatic plants must be added to their common food; whilst succulent and inodorous plants, must be added to those nourished in the second; for good pastures depend as much on the soil and aspect, as on the variety of plants of which they are composed. To conclude, the foundation of the opinion of authors, who say that manipulation does every thing respecting the quality and the quantity of butter and cheese, and the pastures nothing, is totally overthrown by reason and experience; for the influence of vegetables on the nature and quantity of these two products is evident, as well as that of the processes employed to facilitate them."

3. *Of the Breath.*—An attention to the expired air, discloses to us, that many things taken at the table, often find their way, more or less undecomposed, into the blood of the pulmonary artery, and then go off with the aqueous vapor secreted by the lungs. The odor of onions and garlic has been observed by the whole world, and the aroma of whiskey and other ardent spirits, may at any time be perceived in the breath of one who has drunk to excess. In these cases the peculiar smell is not derived from portions of these different articles lodging about the teeth, for no detergence can remove it; the smell continues for several hours after the ingestion; and is as perceptible in the air expired through the nostrils, as in that which issues from the mouth.

4. *Of the Perspiration.*—We are assured by travelers, that the Icelanders who live mainly on fish and fish oil, have a perspiration which is exceedingly offensive, especially when they are crowded together in a warm room, and that it bears no little resemblance to the odor of the oil which they eat.

5. *Of the Urine.*—Dr. Johnson (An. Chem. Vol. 2, p. 366) asserts that asparagus, olives, garlick, onions, artichokes, horse radish, and some other vegetables, communicate to urine a peculiar and disagreeable smell.

Macquer, he informs us, declares that he has known persons, accustomed to head-ache and bad digestion, whose urine retained an evident odor of the food they had taken, such as coffee, roots of various sorts, fruits, pulse, and even soup and broths when made of indigestible meats.

Dr. Wollaston has shown that when birds are nourished solely upon plants, or non azotic substances, their urine scarcely contains any acid; while on the contrary it is very great, when they are nourished by substances containing azote, (Orfila Med. Chim. tom 2 p. 440.)

Dr. Magendie fed a dog on sugar till he died. The bladder was distended with urine, which Cheveruel found to possess all the characters belonging to that of herbivorous animals; that is, instead of being acid like that of the dog and other carnivorous animals, it was sensibly alkaline, not exhibiting any trace of uric or phosphoric acid. It was in short destitute of azote. The experiment was repeated twice with the same results. I may add that the bile in these cases afforded a considerable portion of picromel, a substance which contains no azote and is said to be peculiar to the bile of herbivorous animals.

6. *Of the Blood.*—As the milk, pulmonary vapor, perspiration, and urine are derived from the blood, it follows that the foreign matters which I have enumerated, as being sometimes present in them, must in all cases have been previously in that fluid. When there, they are dissolved in its water. It would, obviously, be more difficult to detect them in the blood than in the secretions, for in the latter they are more concentrated, and they are accumulated in the channels by which they are to be conveyed out of the sanguiferous system. They are of course not decomposed, in the blood vessels, for if so, there would be no necessity for depurating the system of them; and, moreover, if once decomposed, they could not, being organic compounds, ever be recomposed, in the excretions, which are no longer under the laws of organic but inorganic chemistry.

II. Of the modifications of the flesh and other solids in animals from changes in their food and drinks.

The flesh of the sheep, is well known to be remarkably influenced by its food. Wet pastures, with rank vegetation, give to mutton a bad quality; while dry hills, abounding in aromatic plants, render it delicious.

The beef of the ox that has run at large and subsisted only on wild grasses, is very different from that of the same animal that has been kept in the stable. That fed on oil cake, which will fatten them sooner than any other food, is bad.

The flesh of the hog is especially influenced by its food. Doctor Pearson (Practical Synopsis, p. 28) observes, "In Corsica where the hogs feed on chesnuts, and in Persia where they are often fed on dates, their flesh is peculiarly good, and the same remark is true," continues he "of some tropical countries, where they eat the sugar cane."

In this country, the flesh and fat of hogs which subsist and are fatted upon acorns and beech nuts, is strikingly different from that of those fed on Indian corn. It has a peculiar smell and taste, and is much softer than corn-fed pork; approaching, indeed, very much to the nature and properties of bear's flesh and oil, which are formed from the same materials; and, indicating to us that the digestive and nutrient organs of animals, as different as the bear and the hog, when supplied with the same aliment, produce from it parts not very unlike each other. It is well known, that if, when the hog has been fatted on acorns and beech nuts, it is put for a few weeks on Indian corn, the quality of its fat and flesh is materially changed.

The pork that is produced from the sediment of a distillery, has a different taste and smell from that produced from corn.

When the hog has subsisted in a great degree upon shell fish, which it does in the neighborhood of bays and harbors, its flesh has a peculiar taste; and, if I have not been misinformed, when it eats cotton seeds, the pork it affords is extremely unpleasant.

The flesh of several species of water-fowl, particularly the brentgoose, puffin, solan goose and gull, has an offensive,

fishy flavor and odor, from those birds subsisting on fish. Pearson, p. 31–32.

Mr. Hunter fed two ducks for a month, one on barley, the other with sprats. They were killed at the same time. When they were dressed, the latter tasted so strong of fish that it could scarcely be eaten.—Ibid.

In the winter season, when, from a scarcity of their common food, several species of thrush (turdus) are compelled to subsist on berries of the misseltoe, ivy, holly, and spindle tree, (Euonymus Europœus,) their flesh becomes bitter, and acquires a purgative quality.—Ibid, 33.

The anas ferina, or canvas-back duck, feeds on the roots of the Valisneria Americana, in the Chesapeake bay, and this renders its flesh the most exquisite dainty within the reach of the American epicure.

The deer of America, sometimes feed on the berries of the Kalmia latifolia, and thence their flesh, it is asserted by Professor Barton, acquires purgative properties.

The flesh of wild pigeons, which have eaten poke berries, (Phyy. decand.,) it is said, by the same naturalist, is purgative.

Haller asserts, that the smell of garlic is perceptible in the flesh of the peacock, that has fed on it.

III. Of modifications of the solids and fluids of animals, by subjecting them to articles of food, which they do not naturally eat, or by confining them to a single substance.

If the digestive apparatus possesses the power of forming the same kind of chyle, out of every nutritious substance that is not poisonous, it must be able to supply those principles of our composition that are essential to it, and which may not be present in the aliment used. On this subject, experiments have not been numerous.

Azote is the characteristic ingredient of animals; but whether this be a simple body, we do not certainly know; the alkalies and water seem to act like simple bodies, and till lately were considered as such. They are compounds; and azote, may be, has indeed been suspected of being, also a compound. But, even, animals that are most strictly herbivorous,

take in no small quantity of azote, in the innumerable variety and number of insects that adhere to the vegetables on which they subsist; in the myriads of animalcules which inhabit the waters they drink; in the atmospheric air that is blended with their food and water; and in the albumen, gluten and mucilage, and several other principles of plants that contain azote, to say nothing of the probability, that a portion of azote is absorbed in respiration.

The point can only be settled by causing an animal accustomed to a mixed diet, to subsist on one destitute of azote; keeping it at the same time upon distilled water.

This has been done by Magendie, (see Elements of Physiology, p. 376,) who fed a dog on pure white sugar, composed of hydrogen, oxygen, and carbon, and gave him no drink but distilled water. For seven or eight days he appeared to be very well, was sprightly, ate with avidity, and drank as usual. He began to grow thin the second week, although his appetite was good, and he ate six or eight ounces of sugar every twenty-four hours. His alvine excretions were neither frequent nor copious, but his urine was in sufficient abundance. The emaciation increased in the third week, the strength diminished, the animal lost its spirits, and its appetite became less. At this period there happened, first upon one eye, and then upon the other, a small ulcer, in the centre of the transparent cornea; it augmented rapidly, and in the end of a few days it was about a line in diameter, its depth increasing in the same ratio; the cornea soon became perforated, and the humors of the eye flowed out. This singular phenomenon was accompanied by an abundant secretion from the glands about the eyelids. In the meantime, the emaciation continued to increase, and the strength diminished daily; and though the animal, every 24 hours, ate three or four ounces of sugar, its weakness became so great, that it could neither chew nor swallow, and it expired on the 22d day of the experiment. I examined the body, continues the author, with every possible precaution, and there was no fat to be found. The muscles were reduced more than five-sixths of their ordinary

volume, the stomach and intestines were much diminished in size and strongly contracted. The gall and urinary bladders were distended with their peculiar fluids." These fluids, I have already stated, approached very nearly to those of herbivorous animals, in having no azote, nor, according to Magendie, was there much of that substance found in the excrements.

Two other animals, subjected to the same diet, died with the same symptoms, and exhibited on dissection, the same appearances.

Two other animals of the same kind, were then fed on olive oil and distilled water. They did not experience an ulceration of the cornea, but had all the other symptoms, and after death exhibited the same anatomical characters.

To several dogs he then gave gum arabic. It produced the same results as the sugar and oil, except that an ulceration of the cornea did not occur as with the former substance.

Finally, he fed a dog exclusively on butter. He continued to eat it till twenty days before his death, which occurred on the thirty-sixth day. The right eye of this animal became ulcerated like those of the dog first mentioned. The other symptoms, appearances after death, and chemical composition of the fluids, were as in the first instance.

To satisfy himself that these different substances were digested, he fed several dogs with them, and in a few hours afterwards opened them. He found both chyme and chyle. The quality of the latter I have already mentioned.

From these experiments it results, that an animal accustomed to a mixed diet, when reduced to one purely vegetable, that is, one containing no azote, cannot exist; and that even the absorption from its own solids, and from the atmosphere, were not sufficient to supply azote for the secretions in which that principle is usually present.

The causes and symptoms of the disease denominated scurvy, may here be referred to with propriety. Nothing is more certain than that a diet of salt meat, without any fresh vegetables, continued for a long time, is capable of producing this disease; the phenomena of which indicate astonishing changes,

both in the solids and fluids. In the course of the disease there is a general hæmorrhagic disposition. In this state, a diet of fresh and ascescent vegetables will effect an immediate cure. Every circumstance to my mind indicates, that the disease is in a great degree produced by the want of the proper kind of materials for maintaining the usual composition of the blood and solids, and supplying the waste of the body; and that it is cured, not by the action upon the stomach of the simple remedies of which I have spoken, but by the introduction of some part of them into the system with the chyle.

In Diabetes mellites Dr. Rollo found, that the secretion of sugar by the kidneys, was immediately stopped by a diet of animal food. In some of his patients who continued it for a great length of time, there was a secretion of oil on the surface of the body, fœtid breath, saltish taste, languor, and other symptoms which he considered indicative of approaching scurvy.

Finally, Dr. Stark made a number of experiments to determine the effects of different articles of food when persevered in for some time. His first experiment was with bread and water; which produced no very marked effects. To this succeeded a diet of the same kind with sugar. After he had continued this diet for about a fortnight, he perceived small ulcers over the inside of his cheeks. The gums were swelled, red, and bled when pressed with the finger; and the right nostril was internally red and purple, and very painful. After this, small purple streaks appeared on his left shoulder. His appetite now failed, and he could not taste sugar, which induced him to have recourse to wine and meat. During the continuance of this diet, he had in general every day three or four liquid alvine evacuations, containing some clear gelatinous matter, and he felt but little pain or flatulence in his bowels.—(*Edin. Med. Coment. for* 1788, *vol.* 7.)

General Conclusions.

1. Both the solids and fluids of the body are affected in their composition and qualities, by the food on which the animal subsists.

2. The system, at all times, makes an effort for the production of chyle and blood of the same quality, in each species; and when the food thrown into the system, is too unlike the composition of our bodies, disease, and even death itself may be the consequence; and in these cases the morbid condition exists primarily in the fluids.

3. This involves no paradox, for the fluids existed before the solids; and every thing taken in to supply the waste of the system, becomes a part of the fluids, before it enters into the composition of the solids.

4. The fluids, as far as we can observe, and I profess to go no farther than we can travel by the light of manifest phenomena, are equally concerned with the solids, in the great function of nutrition. Without both solids and fluids, there could be no circulation, and without circulation there could be no nutrition. Solids are the mechanical, fluids the chemical agents of the vital power, and they are equally necessary.

5. The question of the relation of alimentary substances, to the living body, is one of pure observation. We have no principle by which we can decide it *a priori;* for the living body is unique in nature, and governed by its own peculiar laws. One of these laws is, that the animal shall act upon and change the constitution of surrounding objects;—another, that it shall be acted upon and its physical condition altered by them. Perfect assimilation is the ultimate term of its influence upon *them.* Death, by the termination of all the functions, is the maximum of *their* influence over *it.* Among them, there are some on which it can produce no change: others which it invariably brings to its own condition. It acts upon them, and they react. It places them on its procrustus' bed, but they struggle against its amputations; and many of them, in virtue of *their* vis conservatrix, enter the living system but partially changed, in defiance of *its* vis conservatrix. Each strives to maintain its identity, and within certain limits each succeeds:—to a certain extent, they both fail. Thus the animal seeks to preserve its actions, sensations, functions, and the *composition of its solids and fluids,* in a *uniform*

state; but it fails, for it can accomplish *nothing perfectly.* The functions, and the composition of the organs that perform them, are *both* liable to variations; and, as we might have expected, had we looked at the matter without prejudice, are subjected to the same law, for they are governed by the same power.

I consider, then, the alleged absolute dominion of the organs of nutrition and assimilation, over alimentary matters, as a perfect anomaly in the plan of living nature; and the pretended uniformity of the flesh and blood, of the same animal under wide diversities of diet and drinks, as a philosophical chimera, unsustained by facts, and unworthy of modern science.

Art. II. — Meteorology.

1. *Abstract of Meteorological Observations, for the Calendar year* 1835. By Professor Ray, of Woodward College, Cincinnati.

Editorial Remarks.

The spot where the observations, (the results of which are stated in the following tables,) were made, is on the plain north of the Ohio river, nearly a mile from the margin of the stream; about fifty feet above high water mark; and five-hundred feet to the south-west of the range of hills, which rise nearly three hundred feet above the plain. Its elevation above the level of the sea, is not far from five hundred and forty feet. Lat. 36 deg. 6 min. N. — Long. 84 deg. 27 min. W. The contiguity of this place of observation, to the hills which lie immediately to its north-east, would seem calculated—in consequence of their reflection in summer, and radiation in winter—to keep the temperature of both, a little higher than

it would otherwise be; but a comparison of the results obtained by professor Ray with others, does not show that kind of influence; for in five continuous years, that the editor of this Journal, formerly, made meteorological observations, in another part of the city, the mean annual heat never fell below 52°.65, while that of 1835, as may be seen in the table, was 51°.3. That year was, indeed, taking it altogether, a cold year, as professor Ray has remarked; and brought forth one day, February 8th, that had not been equaled, in Cincinnati for thirty-eight years;—that is, since the 8th of January, 1797, when according to Governor Sargent, the mercury fell to 18 deg. below zero, *one degree lower* than it fell last year.

ABSTRACT.

	Thermometer				Weather			Rain & melted snow		Barometer			
	Maximum	Minimum	Range	Mean Temp.	Clear & fair days	Variable	Cloudy	Inches	100ths	Maximum	Minimum	Range	Mean
January.	66	3	63	34.6	13	8	10	3	82	29.74	28.73	1.01	29.310
February.	56	-17	73	24.5	6	12	10	1	75	29.79	29.05	.74	29.460
March.	70	1	69	40.1	16	9	6	1	86	29.89	28.74	1.15	29.368
April.	83	21	62	50.5	9	11	10	3	37	29.58	28.91	.67	29.249
May.	91	40	51	65.3	11	13	7	7	57	29.51	28.94	.57	29.286
June.	95	45	50	71.2	8	16	6	7	34	29.51	29.04	.47	29.304
July.	93	48	45	71.7	11	16	4	2	46	29.53	29.18	.35	29.346
August.	89	46	43	69.1	9	16	6	6	54	29.52	29.13	.39	29.338
September.	86	33	53	59.1	10	12	8	3	23	29.66	28.79	.87	29.371
October.	82	29	53	55.8	16	8	7	4	35	29.73	28.96	.77	29.403
November.	76	3	73	43.3	6	9	15	6	66	29.67	28.70	.97	29.334
December.	63	9	54	31.4	12	5	14	2	20	29.75	28.92	.83	29.464
				51.3	127	135	103	52	15				29.3528

WINDS.

	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.
January.	2½	9½	2	3½	1½	5	4	3
February.	0	3	0	1	1	7	9½	6½
March.	1½	3½	2½	1½	2	4	10	6
April.	0	2½	3	2	0	4	9	9½
May.	2½	3½	2	3½	½	12½	3½	3
June.	1	5	3	6½	½	3	6½	4½
July.	0	4	3	0	4	2½	16½	1
August.	2	7	2	1	1½	3½	7½	6½
September.	1½	3½	1	3½	2½	3½	6½	8
October.	3½	3	0	2	2½	5½	13½	1
November.	1	1½	1	2½	1½	10	9	3½
December.	½	3	1	1	2	8	11	4½
	16	49	20½	28	19½	68½	106½	57

Mean temperature of the year, - - - 51°.308
Maximum height of thermometer, June 13th, - 95°.2
Minimum do. do. Feb. 8, - —17°.0
Range during the year, - - - - - 112°.2
Warmest day in the year, July 28, mean temp., 82°.1
Coldest day in the year, Feb. 7, mean temp., —5°.2
Mean height of barometer for year, (inches) - 29.3528
Maximum height of barometer, March 4th, - 29.89
Minimum height of do. Nov. 12th, - 28.70
Perpendicular depth of rain and melted snow, (inch.) 52.15
Dryest month in the year, March.
Wettest do. do. June.
Clear and fair days, - - - - 127
Variable do. - - - - 135
Cloudy do. - - - - 103
For Winds see the Table.
The Ohio River was not frozen over at this city during the present year.

The year 1835 was remarkable for intensely cold weather, of which there were two periods. The first occurred near the beginning of January, and was felt principally in the North-eastern and Middle states: the second occurred in the early part of February, and was confined chiefly to the Southern and Western states. On the 4th of January at Bangor in Maine, the mercury was frozen; and on the 8th of February the temperature at Lexington, Ky., was 20 degrees below zero. The harvest in the western states was unusually late. According to the statements of some of the oldest inhabitants, so backward a harvest had not been known since the settlement of this country.

JOSEPH RAY, M. D.

2. "*Meteorological Notices in Indiana.* By D. Dale Owen." Silliman's Journal, for January, 1835.

Editorial Note.

In the last number of the American Journal of Science, (a work which should be in the hands of every man of learning and every man of wealth in the United States,) there is a short meteorological paper, most of which we propose to extract into our *Western* quarterly, which *should* be made a repository of all the observations, which the different Meteorologists of the Valley of the Mississippi may record. Mr. Owen's residence is in New Harmony, on the banks of the Wabash, at an elevation above the level of the sea, not quite so great as that of Professor Ray; in lat. 18°. 11', long. 87°. 55':—1° 5' South, and 3° 28' West of Cincinnati. His table embraces observations from the 1st of February, 1828, to the same day of 1829. Three observations were made daily—viz. in the morning soon after sunrise, about one o'clock, and at sunset. It is to be regretted, that while these observations (as far as the thermometer is concerned) may give us very nearly the mean temperature of the day, they do not indicate the extremes, as the greatest depression is, in general, *before* sunrise, and the greatest elevation between two and three o'clock.

"Barometer.

Months.	Mean.	Maximum.	Minimum.	Range.
February,	29.574	30.075	29.050	1.025
March,	29.583	29.886	29.150	0.736
April,	29.547	29.912	29.030	0.882
May,	29.547	29.830	29.360	0.470
June,	29.538	29.660	29.290	0.370
July,	29.604	29.780	29.450	0.330
August,	29.638	29.800	29.450	0.350
September,	29.688	29.890	29.490	0.500
October,	29.697	29.950	29.400	0.550
November,	29.555	29.990	29.140	0.850
December,	29.746	30.100	29.270	0.830
January,	29.611	30.150	29.200	0.850

Mean for the year, - - - - -	29.609
Maximum for the year, - - - -	30.150
Minimum for the year, - - - -	29.030
Range during the year, - - - -	1.120

THERMOMETER FOR THE SAME YEAR, VIZ. 1828.

Months.	Mean.	Maximum.	Minimum.	Range.	Days of rain, &c.
January,	40.2	64	12	52	9
February,	41.9	68	12	54	8
March,	51.6	82	20	62	5
April,	55.2	86	28	58	7
May,	68.1	91	42	49	9
June,	78.5	96	55	41	8
July,	77.6	92	53	39	4
August,	76.7	90	63	27	6
September,	62.	84	42	42	3
October,	55.3	79	27	52	2
November,	44.5	64	26	38	4
December,	40.4	63	16	47	3

Mean temperature of the year, - - -	57.7
The lowest, (January) - - - - -	12.
The highest, (June) - - - - -	96
Range for the year, - - - - -	84
Greatest range during a single month, (March)	58
The least, (August) - - - - -	27
The number of days, during which any snow or rain fell, (about 1 in 5¼) - - - -	68

The most prevalent wind in January, 1828, was W.; in February, W.; in March, S. W.; in April, N. W.; in May, S. W.; in June, S. W.; in July, S. W.; in August, N. W.; in September, N. W.; in October, N. W.; in November, N. W.; in December, N. W.

Almost invariably, the barometer is the highest here, when the wind blows from the N. W., and lowest when it blows from the S. E. As a general rule it rises when the wind blows from the N. W.—N.—N. E., and falls when it blows from the S. E.—E.—S.

The N. W. wind generally brings clear, dry weather, and the atmosphere is then *highly* charged with electricity (particularly in the months of November, December, and January.) The S. W. wind in summer generally brings the thunder storms. The S. E. wind brings the rains of longest duration. The E. and N. E. winds bring the snow storms.

One of the most remarkable meteorological phenomena in this country, is the wonderful electrical state of the atmosphere, and all non-conducting bodies during the autumn and first winter months, when the wind blows from the north west. I have observed, at such times, the hairs of the horses tails so charged, that whole bunches would adhere with considerable force to the horses flanks, or, at other times, the individual hairs, repelled by their neighbors, would stand several inches apart. Distinct shocks, may then be obtained in the fingers, by rubbing the back of a cat with one hand, and holding the point of its tail firmly with the other. One day, last winter, I observed a silk apron attracted by the table so strongly, and at such a distance from it as to enable the wearer to keep it suspended in the air, at a full right angle. When silk or flannel is removed rapidly

from the body in the dark, it will exhibit for the moment, one luminous electric sheet, and a distinct crackling noise may be heard. Besides these facts many very interesting electrical phenomena may be observed.

3. *Extract from a "Report on the Recent Progress and Present State of Meteorology.* By JAMES D. FORBES, Esq.," etc. etc., made to the "British Association for the Advancement of Science," at Oxford, in the year 1832.

It was but lately, that we met with the learned and deeply interesting volume, which gives the origin, and transactions for its two first years, of the society just named. It has not been reprinted in America, although it might be circulated here with great advantage. Among other Reports on sciences connected with medicine, is one on *Organic Chemistry*, which, we expect, will be made the basis of an article, for our next number, by our respected colleague, Prof. Rogers, of Cincinnati College. Mean while, we cannot resist the temptation, to place before our readers, in connection with the tables of Prof. Ray, and Mr. Owen, that part of Mr. Forbes' Report, which relates to temperature, (regretting that our limits do not permit us to insert the whole;) and we venture to indulge the hope, that it may stimulate some of them to renewed observations and inquiries. They reside in a country, the atmospheric laws of which are but vaguely comprehended; and could not, therefore, fail to reap a rich reward of *new and striking* results. EDITOR.

TEMPERATURE.

The thermometer is certainly the most perfect of our meteorological instruments. The range of natural temperatures being confined on the surface of our globe within comparatively narrow limits, namely, 96° centigrade or 172° Fahrenheit in the shade*; the indications of the mercurial thermometer may be considered as absolutely accurate. Notwithstanding, too, the difficulties of procuring tubes of perfect calibre, or making due allowance for its variation, the deviations of thermometers made by different makers may, when particular care is taken in their construction, be confined

*Arago, *Annuaire du Bureau des Longitudes*, 1825, p. 186.

within very narrow limits. This I have recently had the means of particularly observing in some comparisons of standard thermometers belonging to the Royal Society of Edinburg, by Professor Christison and myself*. The relation of the mercurial to the air thermometer has been investigated since Gay-Lussac's and Dalton's experiments, by MM. Dulong and Petit, who extended the examination to a great range of temperature. More recently M. Auguste has taken up the subject, and given a formula of comparison†. M. Parrot has re-investigated the subject of the fixed points of thermometers‡. He finds that the purity of the water employed has a sensible influence on its point of congelation; and has observed one tenth of a degree of Reaumur between that of the water of the river Neva and distilled water. He has likewise determined that the maximum heat of water in a state of ebulition occurs at and below seventeen lines under the surface.

Nothing has lately been done in the way of materially improving self-registering thermometers: Rutherford's are still the best. Magnus has proposed one acting by the expulsion of mercury from the end of the tube‖, — a proposal made, in the middle of the last century, by Lord Charles Cavendish, and since that revived by Mr. Blackadder§. I have elsewhere taken occasion to point out the principal defects to which it is liable¶. In connection with the thermometer we must mention an elegant method devised by M. Bessel of finding the correction to be applied to any thermometer on account of inequalities in the bore; which consists in breaking off columns of various lengths of mercury in the tube, causing them successively to traverse the length of the scale; and by noting the spaces occupied by each at the different points, an equation for the scale of the particular instrument may be formed**.

A very interesting discovery has recently been made with regard to the early history of the thermometer, by Signor Libri of Florence††. In 1829 were found at Florence a large number of the original alcoholic thermometers made under the direction of the Academia del Cimento, which enabled Sig. Libri to restore the true scale of these early instruments so as to afford a direct comparison with those of modern times. The scale was divided into 50 degrees. The zero corresponded to —15° of Reaumur, the 50th degree with 44° R; and it stood at 13½° in melting ice. The latter fact is interesting because it shows that no sensible change had taken place in the freezing point of those instruments during the lapse of nearly two centuries; for it is recorded that in melting ice the liquid marked 13½°. It is well known that, from whatever cause, many old thermometers indicate a temperature somewhat above 32° Fahr. when plunged in melting ice. In some cases however the change has not

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* Captain Sabine (*Account of experiments with the Pendulum, &c.* 4to.) found the difference of above a degree in two standard thermometers by the same maker. Such an error however cannot be considered unavoidable.

† Poggendorff's *Annalen*, 1828.

‡ This he has published in a Latin pamphlet, 4to: Petropoli, 1828.

‖ Poggendorff's *Annalen*, xxii. 146. § *Edinburgh Transactions*, vol. x.

¶ *Edinburgh Journal of Science*, ix. 300.

** Poggendorff's *Annalen*, 1826. Also *Bulletin des Sciences Mathematiques*, viii. 42., and *Philosophical Magazine*, vol. lxxiii. †† *Annales de Chimie*, xlv. 354.

been noticed, and this is one of the most remarkable examples. Some years ago the question excited considerable discussion; but as nothing has been added to our knowledge for some time, I shall merely refer in a note to the papers which have treated of it*. By an accident almost as fortunate as the recovery of the thermometers, some registers nearly complete for sixteen years and kept by Raineri, a pupil of Galileo, have come to light; and by the discussion of them, with a knowledge of the true scale, Signor Libri has been able to show that no sensible change has taken place upon the climate of Florence between that period and the present, which had been suspected.

The metallic thermometers of M. Breguet have not been so much used as might have been expected; they are however rather adapted to delicate experiments on heat than to Meteorology in general. The same remark applies to the beautiful thermo-multiplier recently invented by Signor Nobili†, and which he has applied to the investigation of some of the most delicate phænomena of radiant heat‡.

In the use of the thermometer, the sources of error from terrestrial and solar radiation have not been sufficiently attended to. Some hints on the subject may be found in the article THERMOMETER in the *Edinburgh Encyclopædia*. The mode of exposure of the thermometer of the Observatory at Paris is described by Pouillet in his *Elemens de Physique*.

These various sources of error go far to diminish our confidence in the nice accuracy of thermometric results, where they have not been the subject of particular attention. It is surprising at what a distance a sensible portion of heat is conveyed from soil and walls, or even from grass, illuminated by the sun; the *maxima* of temperature are thus generally too great, and from the near contact in which thermometers are generally placed with large difficultly conducting masses, such as walls, the temperature during the night is kept up, and the *minima* are thus also too high.

This however has been by no means the greatest difficulty in determining the mean temperature of a given spot. Since it is difficult to have the thermometer observed oftener than twice or thrice in a day, it becomes an object of great importance to determine those hours the mean temperatures of which will give that of the whole twenty-four. This however involves an accurate determination of the curve of diurnal temperature; and as this varies with the seasons, its connexion with the curve of annual mean temperature must also be assigned. It is obvious that for these objects a very extended scale of observations is requisite, but that when once attained, the results will be subject to the same general law throughout a considerable extent of country. The mean of the maximum and minimum temperature measured by a register thermometer is one of the best approximations; it is however by no means absolutely accurate. The multiplication of hourly observations has only in one or two instances been resorted to for filling up this blank; but it is to be

* Flaugergues, *Bibliotheque Universelle*, xx. 117, xxi. 222, De la Rive and Marcet, *Ibid.* Avr. 1823. Bellani, *Giornale di Fisica*, v. Arago, *Annales de Chimie*, xxxii. Moll, *Edinburgh Philosophical Journal*, ix. 196.

† *Bibliotheque Universelle*, N. S. ii. 225. ‡ *Annales de Chimie*, 1831.

hoped that the facilities which military stations offer for fulfilling this most important object will not be neglected.

The only thermometrical register of great extent which has been undertaken, except that of Toaldo and Chiminello at Padua, and of Neuber at Apenrade, was executed by the military at Leith fort, under the superintendance of the Royal Society of Edinburgh; and an account of the results of complete hourly observations during the years 1824 and 1825 has been published by Dr. Brewster*. The results I consider most important to science; and they afford a proof, which I hope will not be overlooked, that meteorological observations have only to be conducted upon a right scale in order to afford results to a degree of precision scarcely exceeded by any of the physical sciences. The result I particularly allude to is the following. One principal object being to establish the particular hours, the mean of the temperatures of which for the whole year should equal the mean of the whole twenty-four hours, it is obvious that one of these critical times must occur in the morning, the other in the evening. The observations for two years have given the following extraordinary coincidence:

	Hour of Morning. Mean Temp.	Hour of Evening. Mean Temp.
1824	$9^h\ 13'$	$8^h\ 26'$
1825	9 13	8 28
Mean	9 13	8 27

Such a series of normal observations ought to be made in every extensive country; for the critical hours vary materially with the latitude, and also with the height above the sea. At Paris, for example, the mean temperature occurs *before* 9 o'clock in the morning. At Padua the critical hours were $8^h\ 41'$ A. M., and $7^h\ 52'$ P. M. But notwithstanding this considerable variation, occasioned by a difference of 11° of latitude, the *interval elapsed* between the morning and evening mean is remarkably constant. At Padua it was $11^h\ 14'$; at Leith $11^h\ 12'$; and at Apenrade, in Denmark, $11^h\ 11'$†. It is to be hoped that the exertions already made by the British Association for the establishment of an hourly register near the equator, and also one in the South of England, will be successful, as the results would be of the highest interest for science.

Some of the other most important consequences deducible from the Leith observations are the following:

The mean hour of minimum temperature for the year is $5^h\ 0'$ A. M.; that of maximum temperature, $2^h\ 40'$ P. M.

The deviation of any pair of hours of the same name‡ from the mean of the day, is less than 0°·5 Fahr. And of all pairs of hours, 4 A. M. and P. M. are the most accurate.

The reduction of the results of any register made at regular hours, in this climate, to the mean temperature of the day, is readily deduced.

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* *Edinburgh Transactions*, vol. x.

† *Schouw Beitrage zur vergleichenden Klimatologie*, 1827.

‡ "Heures homonymes," Humbolt. This author has observed that the same results are deducible from the Padua observations. *Fragments Asiatiques*, ii. 420.

The mean annual temperature of any hour never differs more than 3°·2 from the mean of the day for the whole year.

The mean daily range is a minimum at the winter solstice, snd a maximum in April. The mean daily range in this climate is 6°·065. The result of the two years agree within $\frac{1}{100}$ of a degree, though the mean temperature was considerably different.

By dividing the curve of daily temperature into four parts, by the maximum and minimum points and the points of mean temperature, the intermediate portions of the curve may be accurately represented by parabolic arcs.

On the whole, these most interesting results give us an insight into what may be done, by multiplying observations, towards bringing the science of Temperature under calculation.

An interesting series of comparative observations were undertaken at Christiana under the superintendance of Professor Hansteen, during the warmest and coldest month of the year 1827*. The result is very striking. The daily variation of temperature at Christiana is in February 12°·01 F.; in July, 12°·09. At Leith, in the former it is only 3°·57; in the latter, 9°·68. The annual variation is also immensely greater at Christiana than at Leith:

	Christiana.	Leith.
Mean of February - - -	16°·224	40°·621
——— July - - - - -	61 ·690	60 ·361
Difference - - - - -	45 ·466	19 ·740

These are striking illustrations of the difference of a continental and an insular climate.

The curves of diurnal and annual temperature have been investigated by Professor Hallstrom of Abo, but before the appearance of the above-mentioned observations; he was led to the following equation for reducing the mean of the temperatures at 10 A. M. and P. M. to the daily mean at any part of the year:

$$v = \tfrac{1}{2}\,(xf + x\,e) - 0{\cdot}33 + 0{\cdot}41 \sin\,\left[\,(n-1)\,30^\circ + 128^\circ\,8'\,\right]$$

where v is the mean temperature; $\frac{1}{2}(xf + x\,e)$ the mean of the morning and evening temperatures at 10; and n the number of the month, reckoning from January (= 1). This is intended to apply all over Europe†. M. Poggendorff inquires with some justice, whether it would not be better to avoid all calculation by inclosing the thermometer in a difficultly conducting medium, by which the daily variations of temperature might be diminished.

A mechanical mode of taking the mean of an infinite number of temperatures has been proposed by M. Grassman, by observing the change of rate caused by the influence of temperature upon the uncompensated pendulum of a clock‡. The idea is a good one, but was proposed long ago by Dr. Brewster‖.

M. Bouvard's valuable paper upon the meteorological observations at the Observatory of Paris, contains much information, deduced

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* *Edinburgh Journal of Science*, ix. 309.
† Poggendorff's *Annalen*, 1825. ‡ *Ibid.*
‖ *Edinburgh Encyclopædia*, Art. Atmospherical Clock.

from the registers of many years, upon the form of the annual curve of mean temperature at Paris*. He observes that the days of greatest and least temperature in the year are the 14th January and the 15th July, differing only a day from an accurate interval of six months; and each follows the corresponding solstice at an interval of twenty-five days. Baron Humbolt has observed the remarkable symmetry of the curve on either side of its maximum ordinate†. The same author has pointed out the near coincidence of the days of mean temperature observed, even in the too short continuance of registers which we possess‡; these are

Buda, 18th April and 20th October.
Milan, 13th —— and 21st ——
Paris, 22nd —— and 20th ——

These interesting inquiries lead to the general subject of Climatology, which, since the publication of Humbolt's masterly Essay on Isothermal Lines‖, has assumed a more satisfactory character than perhaps any other branch of Meteorology. That work has been too long in the hands of every one interested in the particular subject, or in the skillful generalization of groups of facts, to require any notice here; and in touching upon what has been more recently added to our knowledge of the subject, we must confine ourselves within the narrowest limits.

The opinion that the climate of a particular place, or of the globe generally, has materially changed during historic records is improbable; and all the force of that precise and circumstantial evidence which ought to carry weight with it, is against the idea. The eminent naturalist M. Schouw, who has recently published upon several points of interest connected with Meteorology§, has written an Essay, replete with curious matter, upon the supposed change of climate since ancient times, part of which has been translated into English¶, which goes to show that we have no authority for assuming such a change. A similar result has been arrived at by M. Arago, who has collected a number of curious facts relative to great colds which have occurred at Paris, showing, in opposition to an opinion which had been started, that we have no reason to believe the climate to have been deteriorating for some centuries past**. We have already quoted the results obtained by Sig. Libri from the registers of Raineri at Florence.

The old formula of Mayer for expressing the mean temperature of any place in terms of its latitude, which made the temperature of equator 85°, and of the pole 32°, though a respectable generalization

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* *Memoirs de l' Institut pour* 1824. M. Bouvard has also given en equation for the diurnal curve depending upon the sine of the angle corresponding to the time from noon.

† *Fragments Asiatiques*, ii. 422. ‡ *Ibid.* p. 426.

‖ *Memoires d' Arcueil*, tom. iii. p. 462—603.

§ Particularly connected with the geography of plants. See an Essay on the Geographical Distribution of the Vine, *Edin. Phil. Journal;* and an interesting *brochure*, entitled *Specimen Geographiæ Physicæ Comparativæ*, Hauniæ 1828, which contains some interesting camparative views of the climate of the Alps, Pyrenees, and Scandinavian range, the position of the snow line, etc. We have already quoted his work on Oomparative Climatology.

¶ *Edinburgh Journal of Science*, viii. 311.

** *Annuaire du Bureau des Longitudes*, 1825.

for the time at which it was made, was not calculated to stand the experience of another century. Captain Scoresby, I believe, first pointed out its great inaccuracy; and Dr. Brewster, in a paper presented to the Royal Society of Edinburgh, and printed in their Transactions*, showed that the deductions of Humbolt in his Essay on Isothermal Lines would be far better represented by the simple formula

$$p = 81°{\cdot}5 \cos \mathrm{L},$$

p being the mean temperature of a place in latitude L. This indeed applies very well to observations made in the meridian of Europe. A more extended view of the subject, and a comparison of the results of Captains Scoresby and Parry, showed, however, that there must exist two poles of maximum cold, one in America, the other in Asia, round which the isothermal lines circulate: and he has lately pointed out, in a letter to Baron Humbolt†, the remarkable analogy of these to the isodymical lines of magnetic intensity, developed by Professor Hansteen. In a private letter dated 27th March, 1830, Dr. Brewster communicated to me his new formula under this form,

$$t = (\mathrm{T} + p) \,.\, (\sin^{\frac{1}{2}} d \,.\, \sin^{\frac{1}{2}} d') + p,$$

t being the mean temperature of a place of which the distance from the two cold poles is d and d': T the maximum temperature of the globe, and p the minimum. In the meridian of maximum heat which passes through Europe $d = d'$, and the formula becomes

$$t = (\mathrm{T} + p) . \sin d + p,$$

which nearly coincides with the formula $\mathrm{T} = 81°{\cdot}5 \cos \mathrm{L}$ given above, and represents observations extremely well. I was much pleased to see a formula which took into consideration the actual *distance*‡ from the cold poles, because it had always struck me that the modifications of the isothermal lines depended upon the accidental figure of the continental masses, it would be better to discard at once the arbitrary coordinates of latitude and longitude, the essential connexion of climate with the latter being nothing, and with the former modified by an infinity of perturbing causes. This seems, in the arbitrary formula just quoted, to be well effected by making the mean temperature a function of the *distance* from the two imaginary poles of greatest cold. Perhaps the modifying circumstances produced by the physical geography of continents are too complex ever to enter expressly into a formuly which should exhibit the relation of the temperature, as an effect, to its really active causes.

Mr. Atkinson has published, in the *Memoirs of the Astronomical Society*‖, an examination of the results of Humbolt's researches, with a view to obtain an accurate expression for the law of climate. He has however considered it merely as a function of the latitude, which can never represent universally the phenomena. His equation

$$t = 97°{\cdot}08 \cos^{\frac{3}{2}} l - 10°{\cdot}53$$

(where t = mean temperature, l = latitude), it will be observed gives

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* vol. ix. p. 201. † Poggendorff's *Annalen*, 1831: i. 323.

‡ By employing two distinct formulæ for the two cold poles, Dr. Brewster had before introduced the angle of simple *distance*. See *Edin. Trans.* ix.

‖ vol. ii.

the temperature of the equator = 86°·55, and of the pole — 10°·53. The former is decidedly too great, and has been opposed by Baron Humboldt* himself and Dr. Brewster†. It is probable that the mean temperature of the equator does not exceed 81°·5 or 82°.

The temperature of the arctic regions has received the greatest elucidation by the recent labors of Scoresby, Parry, and Franklin. The two last enterprizing travelers have established the existence of a degree of cold quite unsuspected in the northern part of America. From admirably conducted observations, embracing a large portion of the year, the following mean temperatures have been established:

	Lat.	Mean Temp.	Observer.
Melville Island	74¾°	— 1½°	Parry.
Port Bowen	73¼	+ 4	ditto.
Igloolik	69¼	+ 7	ditto.
Winter Island	66¼	+ 9½	ditto.
Fort Enterprize	64½	+ 15½	Franklin.

To Captain Beechey also we owe some interesting meteorological results‡.

M. Arago had concluded‖ from the results of Scoresby, Parry, and Franklin, that the mean temperature of the pole is — 25° cent., = — 13° F. This however is upon the idea that the cold is at a maximum at the pole, which is not probable; it cannot however be much short of that intense degree. The objection to such a result on account of the supposed increase of ice, which would constantly take place if the temperature were below the freezing point of sea water, I have lately endeavored to combat, and to show that observation presents no opposition to theory§.

A gradual accumulation of facts all over the globe is paving the way for a very accurate knowledge of the mean temperature of its surface; and in a few years more our mass of observations will probably be doubled. Great Britain has done most by her arctic expeditions; and it is earnestly to be desired that with the means she posseses of extending this branch of science likewise in equatorial regions, in the vast continent of India, this great and interesting object will yet meet with some attention, although hitherto totally neglected. In France an excellent register, one of the standard ones in Europe, is kept up, by the assiduity of M. Bouvard, at the Observatory; and several valuable series of observations have been produced by French expeditions in tropical regions. In Switzerland, Meteorology flourishes more than in almost any country in Europe; and though its small extent gives little room for contributions to general climatology, other problems of the greatest consequence have been successfully investigated, as we shall immediately have occasion to notice. From Russia much is to be hoped, for, in the prosecution of the science of Mean Temperature, which we believe is even now obtaining daily accessions of facts from observations in the remote

* *Annales de Chimie et de Physique.* Septembre 1826.

† *Edinburgh Journal of Science*, vi. 117.

‡ Beechey's *Voyage to the Pacific, and Behring's Straits*, 4to edit. vol. ii.

‖ *Annuaire*, 1825, p. 186.

§ *Edinburgh Journal of Science*, N. S. v. 17; and *Bibliotheque Universelle*, 1831.

regions of Siberia*; the zeal which has established magnetic observatories in various parts of that vast country†, will not, it is to be expected, neglect the union of some of the most interesting meteorological observations with that of phænomena to which they are so intimately allied. But we wish particularly to allude to the exertions making in the United States of North America to elucidate the mean temperature of that important part of the globe,—one of the most interesting points, indeed, which can at present be examined with a view to rectify our knowledge of the course of the isothermal lines, which, except at the equator, are hardly at all known in the new continent. A great number of Academies scattered over this widely extended country, make annual reports of observations on the mean temperature, fall of rain, and natural phænomena, to the Legislature of New York, and the military stations have afforded extensive series of valuable results‡.

Baron Humboldt has recently published an interesting Essay on the Causes of the Inflexions of the Isothermal Lines‖. Without containing much of novelty, this little work gives some general and philosophical views upon climatology, pointing out the nature of the hourly and daily variations of temperature, the variable absorbent and emissive powers with regard to heat of the materials of which the visible surface of the earth is composed; and the changes which cultivation and other circumstances may gradually effect in the elements of climate, especially with regard to the isotherals§ and isocheimal¶ lines, even when the mean annual temperature suffers little variation. The author next considers, at some length, the particular influence of the configuration of soil in modifying the climate, contrasts the continental arrangements of the two hemispheres, and the characters of a terrestrial and marine climate at the equator. He points out in a clear manner the influence of forests upon temperature, from the shadow they produce, from the coolness created by the evaporation of their surfaces, and from the extended radiating surface which they present. Such are the principally interesting points to which this Essay alludes. In the same volume, Baron Humboldt gives some views upon the climate of Asia, which he has collected during his late journey.

The subject of the decrease of heat as we ascend above the surface of the earth, has excited, and especially in Britain, much less attention than it deserves. We hardly know a finer problem for complete solution in Meteorology. Little has been done towards it during the last few years, but we cannot pass it over quite without notice. The principle upon which this diminution of temperature takes place in the higher regions of the atmosphere, is now universally allowed

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* See Humboldt's *Address to the Petersburg Academy of Sciences*, 28th Nov,, 1829.

† Humbolt, Kupffer.

‡ *Edinburgh Journal of Science*, viii. 303. x. 267, etc.—In alluding to the exertions of different Governments for the advancement of meteorological science, I am happy to be able to add that of Prussia. I have had the good fortune to meet this summer (1832,) in the Alps, M. Kamtz, a zealous member of the University of Halle, who had been sent on a scientific mission by the Prussian Government to establish some most curious facts in Meteorology.—J. D. F., Dec. 1332.

‖ In his *Fragments Asiatiques*, tom. ii. p. 398.

§ Equal summer temperature.

¶ Equal winter temperature.

to be the increased capacity for caloric of air when it is rarefied. The first question for solution is, therefore, the specific heat of air under different degrees of condensation,—a point of by no means easy investigation, and which has engaged the attention of some of the first philosophers of the day, as we have already noticed. It has been investigated experimentally by Dalton, and Leslie, De la Rive, and Marcet; and theoretically by Laplace, Ivory, Poisson, and Avogadro. The object is the more important, as it is intimately connected with the amount of astronomical refractions. We do not consider, however, that the total effect can be expressed simply by the law of specific heats varying with height; and it appears that the experimental data which have been sought by observations on the atmosphere, have not generally been conducted on principles which can lead to conclusive results. I do not allude merely to the use of *insulated* observations of temperature at great elevations, which in my opinion can lead to no general result*, because of the innumerable accidental causes always at work, which can only have their influence multiplied by a long series of observations,—but to the fact, that observations of temperatures at great heights, whether on insulated points or in balloons, have been directly compared with those close to the massive heating surface of the earth, the radiation of heat from which probably exerts far more influence in producing a decrease of temperature in the very lowest strata of the atmosphere, than the general law which is sought for, and which is usually alone considered. The true law of decrease of temperature, such as it would be *if the earth was removed*, must be sought for probably by successive stages of balloon observation†, *commencing* at a considerable height above the surface; or else we must find the means of estimating accurately the calorific influence of the earth by radiation and conduction. There cannot be a question that in the lowest strata the diminution of temperature appears much greater than at higher elevations, if the observations be not made on a naturally inclined surface of soil, but at two stations, one nearly vertically above the other‡.

In order that the terrestrial influence may be as much equalized as possible, observations on the mean temperature of table lands at considerable elevations, (but not covered with perpetual snow, which introduces a new element,) are perhaps the most satisfactory. And hence the reason that Humboldt's equatorial observations are by far the best that we possess‖. Humboldt's general result gives 121 toises of ascent for a diminution of 1° R. The admirable comparative observations at Geneva and St. Bernard, give a surprisingly near approach to this, the difference of mean temperature of the stations being 8°·64 R. for 1069 toises: this gives 123½ for 1° R. or 352 feet for 1° Fahr. This probably is the most correct mean result which we can

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*Such as the collection of insulated observations in Ramond *Sur la Formule Barometrique de la Mecanique Celeste*, p. 189:

†A few observations with balloons have been published by Lord Minto (*Edinburgh Journal of Science*;) it will be necessary however to carry them on upon a much more extended scale, before any general conclusions can be attained.

‡See some observations, remarkably confirmatory of this view, by Sir Thomas Brisbane, (made in New South Wales,) in the *Edinburgh Journal of Science*.

‖ *Observations Astronomiques*, 4to, i. 126.

adopt. The influence of the seasons is very considerable, as the following results of M. Guerin at Ventoux near Avignon, lately published, prove*.

Summer, 80 toises for 1° R., or 156 metres for 1° cent.
Winter, 100 ——— or 195 ———

Some good observations made in summer upon the Rigi by M. Eschmann of Zurich, give 97 toises of ascent for 1° R.† I have succeeded in establishing, in latitude 56°, a system of observation on this interssting point, from which I hope in due time to be able to obtain the most important results.

Several formulæ have been proposed for a general expression of the law of gradation. Lagrange, and many after him, considered the decrement of heat to be simply proportional to the height, and the best observations may be tolerably represented by

$$t = n\,\mathrm{H}.$$

Where t, the decrement of temperature, is expressed in degrees of Fahrenheit, and H in English feet, the coefficient n will be a fraction nearly equal to $\frac{1}{270}$, or between that and $\frac{1}{300}$, for *small* heights where the decrement proceeds most rapidly: the observations of Humboldt and those at the Grand St. Bernard would, we have just seen, make n about $\frac{1}{350}$. Euler considered the progression an harmonical one. Professor Leslie, from experiments upon the heat absorbed by air in rarefaction, proposed theoretically the formula $25\left(\frac{1}{s} - s\right)$ for the diminution of temperature on the centigrade scale; where s represents the density of the air at the upper station. This formula was first proposed without demonstration‡; afterwards the nature of the experiments upon which it rested was explained‖: from its principle, this formula only takes cognizance of the influence of the change of specific heat in the atmosphere, without any reference to the effect of the mass of the earth. Professor Leslie's formula has given rise to several discussions, to which it will only be necessary to refer in a note§.

Mr. Atkinson, in discussing the subject of Astronomical Refractions¶, has examined with great care all the actual observations to which he had access, and from them he has deduced the following formula:

$$h = [251{\cdot}3 + \tfrac{3}{2}(n-1)]\,n,$$

where h is the height of the station in English feet, n the depression of Fahrenheit's thermometer.

An ingenious attempt was made by M. Mathieu** to deduce the law of decrease of temperature in the polar regions, by analysing

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* *Annales de Chimie*, xliii. 428. † *Bibliotheque Universelle*, 1827.

‡ Leslie's *Elements of Geometry*.

‖ *Encyclopediæ Britannica*, Supplement, Article Climate. See also Thomson *On Heat* p. 122.

§ By Mr. Ivory, *Philosophical Magazine*, 1821; by an anonymous writer, *Edinburgh Journal of Science*, vol. v.; and a paper by myself relative to the last-mentioned one, *Ib.* N. S. vol. v.

¶ *Memoirs of the Astronomical Society*, vol. ii.

** Humboldt, *Observations Astronomiques*, i. 155.

two observations by M. Swanberg upon the amount of refraction, by means of the formula of the *Mecanique Celeste*. The result at which he arrived was 243 metres of elevation for a decrease of 1° cent. This however is at variance with the only direct observation we have on the subject. Captain Parry found in latitude 69° 21′, by means of a kite, that the thermometer indicated no diminution of temperature at a height of 400 feet; it stood at — 24°. Much however cannot be inferred from a single observation.

Some observations have recently been made by M. Kupffer in the range of the Caucasus, by means of the temperature of springs, but too few to admit of any satisfactory conclusions*.

We must now touch upon a point of the greatest importance, and which daily increases in interest,—I mean the proper temperature of the globe itself. We have already pointed at the fine views of Baron Fourier relating to this subject; and from the experimental confirmation which they receive every year, there is little doubt that they will soon be established on an immovable basis. He considers the globe as a mass in the process of cooling from an intense temperature. He has proved that the heat may be very intense at a short distance from the surface, and yet from the extremely bad conducting power of the crust, that it may exert no sensible influence on the climate: he actually computes it as not amounting to one thirtieth of a centigrade degree. Towards the centre the heat may be of the most extreme intensity, and the phænomena of earthquakes and volcanoes may be imputed to its influence. The process of cooling, though at first of course comparatively rapid, may now be considered to have reached an asymptotic condition. It is well known that the influence of the seasons, or the total difference of the effect of solar radiation in summer and winter, affects the temperature of the soil to a comparatively minute depth. Experiments with thermometers, sunk to different depths, have been made at Zurich by M. Ott, near Edinburgh by Mr. Ferguson, and at Strasbourg by M. Herrenschneider†. The influence of the solar rays decreases rapidly; and it is probable, from experiments made at Paris‡, that at about 30 metres, or 100 feet, it is almost extinct. The position where this takes place is called by Fourier the "couche invariable," or *invariable stratum;* all variations above this plane are imputed to the influence of radiation, all below to the native or primæval heat of the globe.

A successive influx and efflux of heat is constantly going on in the strata above that of invariability. The heat of the solar rays is constantly acting on it during the day, and with an intensity depending upon the absorbent power of the surface, and the latitude. M. Pouillet, from some ingenious experiments, concludes that the solar rays which reach the surface of our globe in the course of a year, have sufficient intensity to melt a complete stratum of ice over its whole extent of 14 metres in thickness‖. The amount of solar radiation in various parts of the globe, presents almost an open field for investigation. Mr. Daniell, in his *Meteorological Essays*, started the

* *Voyage au Mont Elbrontz*, 4to, Petersburg.

† See a *resume* of these experiments by M. Pouillet; *Elemens de Physique*, ii. 642.

‡ The excellent observations regularly made in the caves under the Observatory are regularly published in the *Annales de Chimie et de Physique.*

‖ *Elemens de Physique*, ii. 704.

apparently paradoxical opinion that the force of solar radiation increases from the equator to the poles; and though his reasonings have been opposed by an eminent French philosopher*, and by meteorologists at home†, we think he has at least had the merit of pointing out the fact, that the force of radiation is much less in the equatorial and much greater in the polar regions than might have been anticipated. Dr. Richardson has made some very interesting though not quite decisive experiments on this subject in the late Northern expedition‡. I am indebted to Mr. (now Sir John) Herschel, for the remark, that observations on solar radiation seem generally to have been made upon an erroneous principle; the true indication of the force of the solar rays, not being the statical effect upon the thermometer, but their momentary intensity mesured by the velocity with which they communicate heat to an absorbent body. We may confidently point out the subject of radiation as one which will reward the researches of the Meteorologist.

When the immediate calorific cause no longer acts, the surface of the globe of course begins to radiate the superfluous heat which it had received, and exactly in proportion to the facility with which it received it, the absorbent and emissive powers of surfaces being equal. Hence a nocturnal radiation of heat takes place from the soil, occasioning that cold which, according to the laws known to regulate this process, is materially affected by the purity of the sky; for it is perfectly certain that clouds or any interposed body, or even the finest films, have a sensible influence in intercepting the rays of invisible heat. To the coolness thus produced in bodies exposed at night to a clear sky, the phænomena of dew have been accurately attributed by Dr. Wells in his Essay on that subject,—a work undoubtedly both philosophical and important, but which it appears to me has received fully its due share of commendation.

Let us now see what experimental proofs we have of native heat below the invariable stratum. It is nearly a century since it was first suspected that the temperature of the earth increased as we descend. The proof however has been reserved for our own day, by the multiplication of observations which might annihilate every plausible objection,—for many such there undoubtedly are. Nor can we assert, that before the late researches of M. Cordier‖ truth has decisively been made to appear. The general consequences which have resulted from his inquiries, and which are substantiated by an abundant collection of facts observed in Cornwall, Saxony, Brittany, Switzerland, America, and other points, are as follow:—That the temperature of any stratum below that of invariability is absolutely the same all the year round§;—That in all strata so situated the temperature increases as we descend, *without any exception*;—That though the results which have been obtained are far from giving the same law of increase for different countries, which from the imperfection of the observations it was impossible to expect, yet the

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* *Annales de Chimie*, Aug. 1824. † *Edinburgh Philosophical Journal*, xiv.

‡ Franklin's *Second Journey*, 4to edit.

‖ *Annales du Museum d'Historie Naturelle*, 1827. See also *Bulletin des Sciences Mathematiques*, ix. 111; *Edin. New Phil. Journal*, vol. v. & vi.; and De la Beche's *Manual of Geology* (Introduction.)

§ See proofs of this in Saxony, *Annales de Chimie*, xiii. 211.

general progression may be stated at from 25 to 30 metres of descent for an increase of one degree centigrade, or from about 37 to 44 feet for one degree Fahr.* M. Cordier has elaborately and successfully refuted the idea, that these effects could be produced by the lamps of the miners, though he has shown the nature and amount of the influence they actually exert. A more refined objection, imputing the heat to the condensation of atmospheric air descending into the mines, has been satisfactorily answered by Mr. Fox†, whose scientific observations on the mines in Cornwall, and especially on their temperature, and the electro-magnetic properties of their metaliferous veins, promise so much towards the advancement of science. M. Magnus, whose register thermometer we have already alluded to, and who applied it to the present object, has recently published some good observations on a boring near Berlin‡. The temperature of the earth, measured by that of deep-seated and copious springs, has conducted to a similar result; for their variation of temperture as connected with latitude is confined within smaller limits than the mean temperature of the air, indicating a *proper temperature* of the earth, which at the mean depth of springs diminishes that of those near the equator, and increases it near the poles; the mean point, or where the ordinary temperature of the earth and that of the air are the same, being about latitude 56°. Von Buch pointed out some years ago this interesting fact‖, which was deduced from his own observations and those of others, especially of Wahlenberg in Sweden§. The question has lately been treated in its greatest generality by M. Kupffer, who has established to a considerable extent the course of what he calls the isogeothermal lines, and has given formulæ for their computation as well for longitude as latitude; for, like Humboldt's isothermal lines, he finds that they do not regularly follow the parallels of latitude, but are subject to anomalous inflections. The form of the expression given by M. Kupffer is

$$a - b \sin^2 l = t,$$

a and b being constants which vary with the meridian of the place, and which he has computed for a range extending from 85° W. to 60° E. of Paris¶. Near the equator, the ground at 25 metres depth appears to have a temperature 2° R. *below* the mean temperature of the air, whilst in Lapland it is as much *above* it. I do not think that the connection of this remarkable fact with the proper temperature of the globe has been pointed out with sufficient distinctness, but this is not the place to insist upon it more particularly.

It is obvious that the temperature of the ocean, which covers so large a portion of the surface of our globe, must have a great

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* M. Kupffer has lately deduced 36°·81 English feet for 1° F. Poggendorff's *Annalen*, xv. *Edinburgh Journal of Science*, April 1832. The recent experiments of M. Gherard in Prussia, communicated by Baron Humboldt to the Academy of Sciences, give 180 feet of descent for 1° R. *Bulletin de la Societe Philomathique.* Mars—Avr. 1832.

† *Philosophical Magazine* 1830. Both to Mr. Fox and Mr. Henwood we are indebted for some excellent original experiments. *Edinburgh Journal of Science*, vol. x.

‡ Poggendorff's *Annalen*, xxii. 146.

‖ See *Edinburgh New Philosophical Journal*, vi. 166.

§ Wahlenberg's observations were orginally published in Gilbert's *Annalen der Physik.*

¶ *Voyage au Mont Elbrontz.*

influence in the modification of its climate. This subject has therefore occupied particular attention. The most active observers have been Humboldt, Scoresby, Parry, Ross, Sabine, Hall, Davy, and Duperrey. The variations of temperature of the sea being comparatively small, the climate is subject to much smaller fluctuations than on continents. As might be expected, the maximum temperature of the air is greater than that of the surface water; the mean temperature however, it appears from the observations of Duperrey, is somewhat less. The temperature, as it varies with depth, is of course amenable to the laws of the maximum density of water; though with respect to *salt* water, this phænomenon still requires elucidation*. Within the tropics, the temperature constantly diminishes as we descend. Towards latitude 70° this decrease vanishes, and an opposite series of phænomena take place; the temperature increasing as we descend. As these points, though interesting in a high degree, are not so intimately connected with Meteorology as those we have been discussing, and those which yet remain, we shall merely give references to those works where general views have lately been given on the temperature of the sea:—Arago, *Annuaire pour* 1825; Humboldt, *Relation Historique*, iii. 514—530, and *Fragments Asiatiques*, ii. 556; Pouillet, *Elemens de Physique*, ii. 684; Recent Observations by M. Lens, who accompanied Kotzebue; Poggendorff's *Annalen*, 1830; and the *Voyages* of Beechey and Duperrey.

* From Erman's experiments it would appear that sea water has no point of greatest density above its freezing point. *Annales de Chimie*, xxxviii. 287.

Art. III.—Supplementary Catalogue of Ohio Plants.

Embracing the species discovered within the state of Ohio, in 1835.* *Catalogue and descriptions read, and specimens exhibited, before the Western Academy of Natural Sciences, March* 16, 1836. By John L. Riddell, M. D., Adjunct Professor of Chemistry, and Lecturer on Botany, in the Cincinnati Medical College.

Araliaceæ.

Aralia hispida, *Michx.* Wild Elder. Dwarf elder. It frequents rocky woods, and grows about 18 inches high. In July, it is said to bear greenish white flowers. On the pine-clad, rubblestone knob, between Kirtland and Painesville, near the Mountain House. Berries nearly black,—ripe near the last of August. The decoction of the root is a powerful diuretic, and has acquired great fame in curing dropsy. It colors the hair black. Whitney's Family Physician, (1833,) p. 187. Dr. Donovan, late Prof. of the Practice of Medicine in Willoughby University, regards it as a good alterant.

Umbelliferæ.

Thaspium barbinode, *Nutt.* i. 196. Thapsia trifoliata, *Spreng.* Brushy prairie, Dayton. Stone's hill, Cincinnati. Flowers pale yellow with us,—in June.

Ranunculaceæ.

Ranunculus acris, *Linn.* Crowfoot. Butter-cup. Flowers yellow,—in May. Perennial, 1 to 2 feet high. Alum creek, Franklin co. *Paddock.* Acrid, rubefacient. Wood and Bache, 543.

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* For a list of the vegetable productions, previously known to be indigenous to Ohio, the reader is referred to a Synopsis of the Flora of the Western States, published in 1835; or, to the Western Journal of the Medical and Physical Sciences, for January and April, of the same year.

R. aquatilis, *De Cand.* Inhabiting stagnant pools; stem 1 to 2 feet long, flowers white, appearing in July. Miami country, and central Ohio.

Coptis trifolia, *Salis.* Gold thread. Swamps in the Western Reserve.

Papaveraceæ.

Meconopsis petiolata, *Nutt.* Abundant on the rich, shaded hill-sides, near the Ohio river. Cincinnati, etc.

Hydropeltideæ.

Hydropeltis purpurea, *Michx.* Water target. Pools, Dresden and Akron.

Flœrkea uliginosa, *Muhl.* False mermaid. Dry hill, in open woods, Cincinnati. Worthington. Grows 8 or 10 inches high.

Cruciferæ.

Nasturtium natans, *De Cand.* Swimming water cress. Flowers pale yellow, appearing in July. Stem two feet long, submersed leaves pectinately divided. Stagnant pools, Bank lick, Ky. *T. G. Lea, Esq.*, Coshocton.

Arabis lyrata, *Linn.* A very delicate species, less than a foot high, growing in tufts among sandstone rocks, in Kentucky, opposite the mouth of the Scioto. Ross co. O.

Thlaspi campestre, *Linn.* River banks, etc. Cincinnati. Worthington.

Grossulaceæ.

Ribes floridum, *Willd.* Wild black currant. Akron.

R. lacustre, *Pursh.* Flowers small, greenish yellow, appearing in May. Three to four feet high, woody. Berries dark brown, hispid. Columbus. *Lapham.*

R. cynos-bati, *Jacq.* Prickly gooseberry. Dayton. *Mr. M. G. Williams.*

Onagrariæ.

Epilobium coloratum, *Muhl.* Rivulet beds, wet meadows etc. Marietta. Worthington. Dayton.

Halorageæ.

Proserpinaca pectinata, *Lam.* Mermaid weed. An annual

aquatic, with finely divided leaves. Stem a foot long. Flowers green, appear in July. Pools, Dayton.

Myriophyllum ambiguum, *Nutt.* Stems 1 to 2 feet long. Leaves incrusted with calcareous (?) matter. Pools, two miles north of Newark, Licking co.

M. scabratum, *Michx.* Coneaught Lake, near Meadville, Penn., a few miles east of the Ohio line. *R. Buchanan.* Summit lake, Akron, O., where I have procured it of two yards length. It is noted by Elliott, and others, as being 1 foot long. Leaves all pinnatifid, segments capillary; flowers purple, in delicate, interrupted spikes.

M. spicatum, *Linn.* Water milfoil. Branching, 18 inches high. Flowers in August and September. Pond, near Mill creek bridge, Cincinnati. The M. verticillatum has not yet been discovered within the state.

Callitriche verna, var. intermedia, *Wild.* Water chickweed. In water running slowly through a swamp, Webbsport, Muskingum county.

Salicariæ.

Ammannia humilis, *Ell.* i. 218. Six inches high, flowers in July. Margin of a pond, 5 miles east of Cincinnati.

Rosaceæ.

Comarum palustre, *Willd.* Marsh five finger. Boggy situations in the Western Reserve.

Stylypus vernus, *Raf.* Med. Fl. i. 223. Grows abundantly in fields, meadows, and woods. Height 1 to 2 feet, flowers yellow, appearing in May, carpels in a globose head, stipitate so as to be raised out of the calyx. Has the habit of a Geum. Central and southern parts of Ohio, Kentucky etc.

Rubus saxatilis, var. canadensis, *Michx.* Rock bramble. Brier herb. Flowers white, appearing in June or July; fruit black. Western Reserve. Rocky hill, Chilicothe.

R. trivialis, var. flaggellaris, *Willd.*? Procumbent, closely armed with slender, declined prickles, not hispid; *leaves* ternate, leafets glabrous, round-obovate, irregularly den-

tate-serrate. Bogs, Akron, among Sphagnums and Andromedas.

Rosa gemella, *Willd.* Perennial, 8 to 18 inches high; flowers large, numerous, pale red, appear in June. Dry, rocky situations. Dupuy's knob, Ky., opposite Portsmouth, O. Hills about Chilicothe.

R. lucida, *Willd.* 4 feet high. Wet. Worthington. June.

R. carolina, *Linn.* Columbus. *Lapham.*

R. ———? branching, 8 to 16 inches high, *prickles* straight, declined, larger ones often in pairs, smaller ones frequently crowned with a gland, or a tuft of stellated pubescence; *leaves* mostly in 5's, oval and obovate, obtuse, acutely serrate and subciliate, smooth above, sparingly pilose beneath; *stipules* lance-linear entire, acute, ciliate and tomentose; *petioles* tomentose; *peduncles* nearly glabrous; *germ* ovate, with a few pedicelled glands; *sepals* lanceolate, attenuate, with two or three linear branches, tomentose within, glandular hispid without, equalling the petals; *petals* large, 1½ inch long, by 1 inch in width, obovate, cuneate, retuse, nearly obcordate, pale red, damask red or almost white; *styles* free. Hills near Chilicothe. Highest part of Dupuy's sandstone knob, Ky., opposite the mouth of the Scioto river. Resembles what I have taken to be R. gemella, *Willd.*, with which it grows, and of which it may be a variety. Flowers in June.

Spiræa tomentosa, *Linn.* Hard-hack. A little shrub, 2 to 3 feet high, with purple flowers—in July and August. Damp meadows. Akron.

Gillenia trifoliata, *Mœnch.* Indian physic. Near Dayton. *Buchanan.*

Pomaceæ.

Pyrus angustifolia, *Ait.* Flowers in May. Franklin co. *Paddock.*

P. melanocarpa, *Willd.* A shrub, 5 to 7 feet high, colonizing marshes and quaking bogs, in the Western Reserve. Flowers in May and June. Fruit deep brownish red, almost black, equalling small peas in size, scarcely edible.

Amygdaleæ.

Prunus borealis, *Pursh.* Red choke cherry. A shrub, 6 to 12 feet high, flowering in May, and growing in woods in the Western Reserve. Fruit ripe in August, equalling small peas in size, astringent, but otherwise agreeable.

Leguminosæ.

Baptisia tinctoria, *Linn.* Wild indigo. Perennial, 2 to 3 feet high, flowers yellow—in July and August. Barrens, near Cleveland.

Lespedeza reticulata, *Pers.* Flowers violet, stem often branching, branches erect, leaves linear, oblong, mucronate. Flowers in August. Grows 2 feet high, on a dry hill three miles north-west of Cincinnati. Specimens from Mr. Lea.

L. sessiliflora, *Nutt.* Purple flowers,—appearing in August. Grows 2 or 3 feet high. Dry hill, four miles north of Cinnati. *T. G. Lea, Esq.*

L. procumbens, *Michx.* Hill-side, Bank lick, Ky. About Cincinnati. *T. G. Lea, Esq.* Meadville, Penn. *Buchanan.*

Lupinus perennis, *Linn.* Wild lupine. Barrens, Dover, Tuscarawas co.

Petalostemon violaceum, *Willd.* Grows a foot high, and is said to flower in July. Prairie, near Middletown, Ohio. Found in August, when past flowering, and called, in the Synopsis, Hudsonia? ericoides?.

Lathyrus palustris, *Linn.* Marsh pea. Perennial, flowers white and purple—in July. Near Worthington, *Paddock.* Wet prairie, two miles south of Columbus. Webbsport.

L. venosus, *Muhl.* Two miles west of Cincinnati. (?)

Vicia caroliniana, *Walt.* One foot in height. Pine knob, near Boston, Western Reserve.

Psoralea latifolia, *Torr.* Has somewhat the habit of the genus Hedysarum. Flowers blue—in July. Grows in hedges, on the borders of prairies, and banks of streams, from 2 to 4 feet high. Franklin co. *Lapham.* Abundant in central Ohio, the Miami country, etc.

Betulineæ.

Betula excelsa, *Ait.* Yellow birch. A tree 70 or 80 feet high, flowering in May and June,—found in low grounds. *Beck.* On the margin of forest-girt swamps, Akron, where it seldom exceeds 40 feet in height.

B. lenta, *Linn.* Black birch. Large tree, found in shady, rocky situations, in the Western Reserve.

Betula pumila, *Linn.* Young branchlets and leaves silky pubescent; older branches brown, glabrous, sparingly punctate, not fragrant; *leaves* orbicular-obovate, an inch in diameter; older ones wholly glabrous, crenate, on short petioles; younger ones covered on both sides with shining pubescence, serrate, subsessile: *fertile ament*, oblong and cylindrical, 8 lines long; *scale* sinuately 3-lobed, unguiculate; *lobes* rounded, two lateral ones eared, sinuses between the lobes extending half way down; *seeds* orbicular, margin almost equalling in width the diameter of the nucleus; styles persistent. I met with this shrub on the 12th of last August, in a boggy tamerack swamp, Copley, Portage co. It rises in height from 5 to 10 feet. Having never seen authentic specimens of Betula pumila, I have thought it prudent to insert this description, especially as the B. pumila is said to grow 2 or 3 feet high.

Alnus serrulata, *Linn.* Alder. By the side of streams, etc. Licking Narrows. Abundant in the Western Reserve.

Salicinæ.

Salix discolor, *Willd.* Bog willow. A shrub flowering in April. Worthington. *Paddock.*

S. houstoniana, *Pursh.* Worthington. *Paddock.*

Euphorbiaceæ.

Phyllanthus caroliniensis, *Walt.* A slender annual, flowering in July and August, and growing on the sandy banks of streams, to the height of 12 inches. Cincinnati. Covington, Ky.

Sapindaceæ.

Cardiospermum halcacabum, *Willd.* Heart seed. Balloon pea. A delicate vine with small white flowers. Fence corners etc., 4 miles north of Cincinnati. *T. G. Lea, Esq.* Woods, Pickaway co. Possibly not a native.

Acerineæ.

Acer spicatum, *Linn.* Mountain maple. A shrub 8 to 10 feet high, flowers greenish — in May. Rocky situations, Bedford. Little Mountain.

Anacardiaceæ.

Rhus copallina, *Linn.* Mountain sumach. Three to ten feet high. Knobs, Kentucky, opposite Portsmouth. Licking Narrows, O. Near Cleaveland.

R. typhina, *Linn.* Stag's horn. Giant sumach. Ten to twenty feet high. Western Reserve. Knobs, Kentucky, (Licking River, Ky., *T. G. Lea, Esq.*)

Violaceæ.

Viola congener, *Le Conte.* The purple flowers of this stemless, perennial violet, may be seen as early as April. Chilicothe. *Ward.*

Cistineæ.

Lechea villosa, *Ell.* Pin-weed. Perennial, 1 to 2 feet high, flowers brown — in July. Barrens, Dover on the Ohio canal.

Helianthemum corymbosum, *Michx.* (?) *Bracts* 2, arising apparently from the calyx, linear or acerose, shorter than the calyx, near one-half its length; *sepals* 3, valve-like, overlapping on the right hand, ovate, prominently convex, acutish, inclosing the mature seed; *capsule* roundish triangular, breadth equalling length, acutish at both ends, 3-valved, 1-celled, with spurious dissepments marking the axis of each valve: *seeds* 9,? flattened spheroidal, attached by filaments to 3 pedicles arising from the base of the valves. Whole plant covered with a dense, very short, stellular pubescence; *leaves* oblong, oval and lanceolate,

entire, acutish, on short petioles, rather smaller than the leaves of Lechea villosa, crowded and somewhat appressed; *flowers* numerous, much smaller than those of H. canadense, (judging from specimens without petals,) subsessile upon the branchlets, paniculate, (not corymbed). Perennial. Stem about a foot high, assurgent and erect. Barrens, Dover, on the Ohio canal.

Sarracenieæ.

Sarracenia purpurea, *Linn.* Side-saddle flower. Abundant on the cranberry marshes and quagmires of the Western Reserve. Massillon.

Droseraceæ.

Drosera rotundifolia, *Linn.* Sundew. Bogs, Akron.

Lineæ.

Linum sulcatum, *mihi.* Root annual, branching, sending up one or two sulcate stems; bark strong, like that of the cultivated flax; *leaves* sessile, lance-linear, acute, margin scabrous, midrib and margin prominent on both sides; *flowers* numerous, on erect fastigiate branchlets; *sepals* 5, lance-ovate, attenuate at the point, base setosely pectinate or ciliate, persistent; *petals* 5, yellow, obovate, one-third longer than the sepals; *stamina* 5; *styles* 5; capsule globose, 10-valved, 10-celled, each cell containing an oval, compressed, oily seed. Stems 2 feet high, leaves mostly three-fourths of an inch long, and one line wide, upper leaves minute. Grows on dry barrens, Dover, Tuscarawas co. Flowers in August.

Caryophylleæ.

Silene antirrhina, *Linn.* Sleepy catch-fly. Grows 1 or 2 feet high, has small, obscure, whitish flowers—in June. Sandstone Knobs, Ky., opposite Portsmouth. Near Chilicothe.

S. nivea, *Muhl.* Flowers white, developed in July. Growing near 2 feet high, on Mill Creek bottom, Cincinnati. A single plant was found last summer, by Mr. Lea.

S. nocturna, *Linn.* Flowers white, flowering in July, annual. Dayton. *M. G. Williams.*

Cerastium hirsutum, *Muhl.* Hairy chickweed. Columbus. *Lapham.*

Amarantaceæ.

Amarantus spinosus, *Linn.* Grows 16 to 18 inches high, flowers in July. Banks of the Ohio river Cincinnati. *Lea.* Introduced.

Chenopodeæ.

Chenopodium hybridum, *Linn.* Grows from 2 to 3 feet high, on road-sides, etc. It is an annual, and is said to have been introduced. Dover.

Blitum capitatum, *Linn.* Strawberry blite. Indian strawberry. This curious little annual herb, grows about 15 inches high, in fields and by-places. It flowers in June. Akron.

Polygoneæ.

Polygonum fluitans, *Eat.* Stems 10 to 20 feet long, with myriads of swimming rootlets. Corresponds perfectly with Eaton's description, Manual, 6th ed., p. 274. Summit Lake, near Akron.

Ericeæ.

Andromeda caylculata, *Linn.* Three to four feet high. Bogs, Akron. Cleveland.

A. racemosa, *Michx.* Marsh. Marietta.

Elæagneæ.

Shepherdia canadensis, *Nutt.* Sea buck-thorn. Shrub 6 to 8 feet high, growing in a sand-stone ravine, Bedford, Western Reserve.

Vaccineæ.

Vaccinium corymbosum *Linn.* var. ——? Fruit black, of a mawkish sweet taste, one-third smaller than that of V. corymbosum; branchlets cinereous, not green, 3 to 4 feet high, being much smaller than the V. corymbosum with which it

grows. In bogs, Copley swamp, Portage co., O. Under surface of the leaves punctate with resinous spots, venation remarkably translucent.

Pyrolaceæ.

Pyrola secunda, *Linn.* Flowers greenish-white, secund; stem 2 to 3 inches high. Little Mountain. Bedford.

Chimaphila umbellata, *Pursh.* Pipsissawa. Western Reserve. Little Mountain.

Compositæ.

Carduus pumilus, *Nutt.* This species exceeds all other native thistles in the size of its flower, at the same time it is remarkably low, varying from 1 to 2 feet in height. Flowers purple,—in August, root biennial. Barrens about Dover.

C. repandus, *Michx.* Perennial, 2 feet high, in flower in June. In the specimens which I have met with, the flowers are generally in threes, and the leaves are not very "closely fringed with spines." (Ell. ii. 269.) Dry sandstone knob, Ky., opposite Portsmouth. Hills south-west of Chilicothe.

C. muticus, *Nutt.* Wet prairie on Mad river, eight miles east of Dayton.

Gnaphalium purpureum, *Linn.* Dry, woodland hills, 3 miles north of Cincinnati. *T. G. Lea, Esq.*

Aster novi-belgii, *Linn.* Columbus, *Lapham.* Dayton, *Van Cleve.*

A. polyphyllus, *Willd.* Prairie, Dayton. Specimen from *M. G. Williams.* Much branched, perennial, two feet high, flowers in September. Abundant in meadows and fields, New Albany, Ia. *Dr. Clapp.*

Eupatorium rupestre, *Raf.* (Where described?) I found a plant in the Miami country, with pale yellow flowers, 2 to 3 feet high, perennial, to which Dr. Short gives the above name.

Cacalia tuberosa, *Nutt.*? Agrees with Nuttall's description, (Genera, ii, 138,) with these exceptions:—*Lower leaves* spatulate and oval, instead of ovate; *upper leaves* with many prominent lateral teeth, not entire; about three feet high, instead of 4 to 6 feet. Corymb many flowered, scales of

the involucre carinate, 5 to each flower, embracing 5 florets, leaves 5 or 7-nerved. The character of the root, I do not know. It may prove a species heretofore undescribed. Wet prairie, 2 miles south of Columbus. Flowers white,—in July.

Helianthus occidentalis, *mihi.* I give this specific name provisionally, being uncertain whether the plant may not have been vaguely described already. *Root* perennial, small, fusiform and fibrous; *stem* simple, pilose; *petioles* very hairy; *leaves* opposite, mostly radical, and on long footstalks, lance-ovate, acutish, attenuated into the peotiles, remotely dentate-serrate, ciliate, 3-nerved, hispid and scabrous on both sides; *upper leaves* very small, entire, subsessile, on short ciliate petioles; *flowers*, in my specimens, single or in threes, naked; *peduncles* hispid; *scales of the involucre* broad-ovate, cuspidate, densely ciliate, equalling the disc; *rays* 12 to 14; *disc* yellow; *chaff of the receptacle* tricuspidate, middle division much the largest; *pappus* membranaceous, fringed with two long pointed projections. Stem 2 to 3 feet high, lower leaves 1 inch broad and 4 inches long, on petioles of equal length. Dry barrens, Dover, Tuscarawas co. Flowers in August, flowers yellow, an inch in diameter.

Coreopsis verticillata, *Willd.* Grows on the rocky heights, across the river from Portsmouth. Flowers yellow,—in June, 2 to 3 feet high. The leaves are lanceolate like those of C. senifolia, and mostly glabrous like those of C. verticillata. This may be the C. senifolia, *Michx.* I cannot perceive any essential differences in Elliott's descriptions of the two species, at least, in those parts which the immaturity of my specimens permit me to inspect. Mrs. Dupuy says this plant is often procured from the Alleghany glades, and after being wilted in an oven, is used as a substitute for tea.

Senecio aureus, *Linn.* Rag-wort. False valerian. Columbus. *Lapham.*

Polymnia uvedalia, *Linn.* Bearsfoot. Woody hill-sides, a few miles north of Roscoe.

Stellatæ.

Galium lanceolatum, *Torr.* Sandstone knobs and hill-sides, Chilicothe. Kentucky, opposite Portsmouth.

G. trifidum, *Linn.* Small cleavers. Wet meadows, marshes, Cincinnati, *Lea.* Webbsport.

Caprifoliaceæ.

Lonicera ciliata, *Muhl.* Fly honey-suckle. Twin berry. A shrub, from 2 to 4 feet high. Flowers yellow, appearing in May. Rocky, hilly situations. Bedford, Western Reserve.

Cornus canadensis, *Linn.* Low cornel. Dry saw mill, Newark. Western Reserve.

Viburnum dentatum, *Linn.* Arrow-wood. Eight feet high. Swampy woods, Western Reserve.

Diervilla canadensis, *Muhl.* Bush honey-suckle. Ohio generally.

Asclepiadeæ.

Acerates longifolia, *Michx.* *Eu.* i. 317. 18 to 24 i. 4. Wet prairie. Scott's plains, Franklin co.

A. viridiflora, *Raf.* Leaves oblong, ocute. Two feet. Dry prairie, Middletown, Miami country.

Gentianeæ.

Menyanthes trifoliata, *Linn.* Buck-bean. Marshy woods, Akron. Cleveland.

Gentiana rubricaulis, *Schw.* One foot high. Dayton. Rare. ***M. G. Williams.***

Polemoniaceæ.

Phlox subulata, *Linn.* Mountain pink. Three to four inches high. Hills, Newark.

Labiatæ.

Lycopus obtusifolius, *Vahl.* Prairies, central Ohio. *Paddock.*

Scutellaria galericulata, *Linn.* Marshes, Webbsport. Walnut Plains.

S. saxatilis, *mihi.* *Roots* filiform, creeping and stoloniferous;

stems always seemingly erect, but really assurgent, square, pilose, sending off branches near the root, simple above; *leaves* pilose on both sides, ciliate, rugose; lower ones round, cordate, laterally and remotely crenate, entire near the base and apex, obtuse, from 2 lines to an inch in diameter, on pilose petioles of greater length; upper leaves lance-ovate, obtuse, with two or three lateral crenatures, abruptly attenuated into short petioles, or sessile; *bracts* lance-oval, obtuse, densely pilose and ciliate; *flowers* in a simple terminal raceme, in pairs, at intervals of nearly half an inch; *calyx* hispid; *corol* pubescent without, glabrous within, three-fourths of an inch long, deep blue, excepting the under side of the tube, which is white; *anthers* pubescent; *filaments* dilated and pilose in the middle. From 6 to 12 inches high. Growing on the arid cliffs, Ky., opposite the mouth of the Scioto. Dry hill, 3 miles south-west from Chilicothe. Flowers in June. The S. pilosa, to which I at first hesitatingly referred it, is described as having "the lower leaves slightly cordate; racemes paniculate, with the flowers crowded; upper leaves nearly acute." (Ell. ii. 90.) "Leaves attenuated into the petiole, flowers whitish, in paniculate racemes." (Beck, 282.) The disagreements do not require pointing out. I have a Scutellaria, procured by Dr. Paddock, near Morgantown, Va., certainly distinct from this, and which agrees very well with the descriptions of S. pilosa.

Stachys cordata, *mihi.* Perennial, whole plant lanuginose, being clad with white, terete, pointed hairs, the larger ones always jointed, the smaller, often crowned with glands or stellular branches; *stem* simple, erect, with four prominent rounded corners, and as many rounded intervening grooves, hairs upon the stem horizontal; *leaves* cordate, oval or ovate in outline, acute, regularly crenate and ciliate, two inches long by one and a half in width, lower leaves on petioles of one-third their own length, those immediately below the spike of flowers, ovate, subcordate, crenate-serrate, on very short

petioles; *bracts* oblong, entire; *calyx* with 5 acute, subspinous teeth; *corol* mottled, red and white, middle lobe of the lower lip rounded; *flowers* sessile, in whorls of six, at intervals generally of half an inch. Grows in woods, to the height of 18 inches or 2 feet, throughout the middle, southern, and western portions of Ohio. Flowers from June to August. Perhaps it is the S. syvlatica of Nuttall, which Beck describes as having "acuminate, serrate leaves; floral leaves nearly linear." (Beck, 279.) Eaton says, "the stem of S. sylvatica is "prickly backwards." In the Synopsis of Western Plants, I introduced the species here described, as S. intermedia, *Ait.* (?); but that species is said to have many-flowered whorls, and oblong subcordate leaves. I have inspected a great number of living plants, as well as many dried specimens, and have uniformly found them characterized as I have described.

S. glabra, *mihi.* Perennial, generally glabrous; *root* descending, sub-fusiform, branching; *stem* branching, with 4 prominent corners and intervening shallow grooves; a few straggling hairs and reversed prickles near the root; *branches* divaricate; *leaves* oblong, seldom oval, acute; lower ones 2 inches long by 1 in width, truncate at the base, on petioles half an inch long; upper ones attenuated into the petioles, subsessile; *bracts* lance-ovate, longer than the flowers, with two lateral serratures; *flowers* generally whorled in sixes, at intervals of half an inch; *calyx* with 5 equal, lance-subulate, subspinous teeth; *corol* variegated with red and white, corresponding to the generic description of Stachys. About a foot high. Flowers in August. Grows on the banks of streams, and in low woods. Miami country. Worthington. Roscoe.

Borragineæ.

Echinospermum lappula, *Lehm.* This noisome weed has the odor of rats. It grows by roads sides, Chillicothe. Newark. Akron. It is annual, has blue flowers, and grows a foot high.

Coniferæ.

Juniperus communis, *Linn.* Juniper. Meadville Penn. *R. Buchanan.* Bedford O.

Taxus canadensis, *Willd.* Dwarf yew. Bedford. Little Mountain.

Alismaceæ.

Sagittaria rigida, *Pursh.* Flowers in July, flowers white. Grows in standing pools of water. Rather variable as a species. Newark, Licking county.

Xylideæ.

Xyris brevifolia, *Michx.* A foot high, flowers yellow, leaves short, grass-like. Flowers in July and August. Found growing in peat earth, margin of the Summit lake, Akron.

Orchideæ.

Spiranthes gracilis, *Beck.* ? Hills, 4 miles north of Cincinnati. *Lea.* 4 to 10 inches high.

Goodyera repens, *Brown.* Root creeping, stem 6 to 8 inches high, flowers greenish white. Little Mountain.

Orchis rotundifolia, *Pursh.* Worthington. *Paddock.*

Habenaria tridentata, *Hook.* Shady swamp, Copley, Portage county.

H. herbiola, *Brown.* Grows in swamps, from 12 to 18 inches high, perennial, flowers small and greenish,—June. Worthington. *Paddock.*

H. blephariglottis, *Hook.* A fine, white-flowered species, growing in bogs, among the Sphagnums and cranberries, Akron. Perennial, 18 to 24 inches high.

H. ciliaris, *Brown.* Damp woods, Cleveland.

H. psycoides, *Spreng.* A perennial, pale yellow flowered species, growing two feet high, in damp woods, Copley swamp, Portage co. Flowers in July and August.

H. retusa, *mihi.* Lip with a prominent, obtuse palate, three-lobed, the intermediate lobe retuse, 4 times larger than the lateral ones, which are rounded and separated from it by repand sinuses; outer segments of the perianth oval, inner

ones orbicular; *spur* clavate, obtuse, equalling the germ; *bracts* lanceolate, alternately acute, shorter than the germ; *leaves* on the lower part of the stem lance-oblong, acute; *flowers* greenish yellow, equalling in size those of Goodyera repens, appearing in August. I have met with a single individual plant, answering to the above description. Barrens a mile east of Dover, Tuscarawas county.

Cypripedium acaule, *Ait.* Woods, Western Reserve.

Junceæ.

Luzula pilosa, *Willd.* Hairy wood-rush. Perennial, 6 to 12inches high, hairy, growing in dry woods, and flowering in April and May. Oxford. Portsmouth. Newport, Kentucky.

Melanthaceæ.

Veratrum angustifolium, *Pursh.* Grows in a wet meadow half a mile south of Massillon, to the height of 2 to 4 feet. Darby plains.

Pontedereæ.

Pontederia cordata, *Linn.* Pickerel weed. Ponds, etc., Akron.

Smilaceæ.

Streptopus lanuginosus, *Michx.* Western Reserve.

Aroideæ.

Calla palustris, *Linn.* Water arum. Procumbent in swamps, ascends 6 to 8 inches, flowers white and green. Western Reserve.

Fluviales.

Potamogeton perfoliatum, *Linn.* Perfoliate pond-weed. Flowers greenish yellow, stems 12 to 18 inches high. Canal 5 miles north of Roscoe.

P. lucens, *Linn.* Shining pond-weed. In the Summit lake, and canal, near Akron.

P. zosterifolium, *Trin.* Flowers greenish yellow,—in July. Stems 2 to 3 feet long, in a pool of clear water, Licking narrows.

Gramineæ.

Poa capillaris, *Linn.* Miami country. *Frank**.

P. angustifolia, *Linn.* ? One or two feet high, flowers in June. Cincinnati. *Frank.*

Polypogon racemosum, *Nutt.* Beard grass. Cincinnati. *Buchanan.*

Trichodium scabrum, *Muhl.* Culm 18 inches high. Cincinnati. *Buchanan.*

T. elatum, *Pursh.* Culm 2 feet high, flowers in September. New-Albany, Ia. *Clapp.* Cincinnati. *Buchanan.*

Trisetum subspicatum, *Brown.* Perennial, 12 to 18 inches high, flowers in June. Dupuy's knob, Greenup co., Ky. Dry hill, Chillicothe.

Bromus mollis, *Linn.* Biennial, 3 feet high, flowers in July. Barrens, Dover, Tuscarawas co.

B. pubescens, *Muhl.* Bigelow's marsh, Cincinnati. *Frank.*

Festuca nutans, *Willd.* Wet meadows, Cincinnati. *Frank.*

Cyperaceæ.

Eriophorum polystachyon, *Linn.* Swamps, Western Reserve.

E. virginicum, *Linn.* Virginian cotton grass. Perennial, 2 to 4 feet high, flowers in August. Swamps, Akron.

Carex setacea, *Dew.* Ditches, Cincinnati. Flowers in June. *Frank.*

C. lupulina, *Muhl.* Wet meadow near the Four mile House, Cincinnati. *Frank.*

C. rosea, *Schk.* Moist woods, flowers in May. Columbus. *Lapham.*

C. laxiflora, *Lam.* Culm 1 to 2 feet high, flowers in April. Woods. Scarce. Cincinnati. *Frank.*

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*Dr. Jos. C. Frank, a most zealous and accomplished botanist, author of "Rastadts Flora," (Heidleberg, 1830,) was deputed by some German society to travel in this country and make botanical collections. He spent a year in Cincinnati before setting out, during which time he gave special attention to our grasses and carices. Unfortunately he fell a victim to the yellow fever, by exposing himself too early, last autumn, to the climate of New Orleans. Dr. Frank left me specimens of all the species introduced into this catalogue on his authority.

C. crinita, *Lam.* Flowers in June, culm 2 to 4 feet high. Marshes, Cincinnati. *Frank.*

C. aristata, *Brown.* Culm 12 to 18 inches high. Shady woods, Miami country. ? *Frank.*

C. cristata, *Torr.* Culm 2 feet high, flowers in June. Shady woods, Cincinnati. *Frank.*

C. virescens, *Muhl.* Culm 12 to 18 inches high, growing in open woods, Miami country. ? *Frank.*

C. oligocarpa, *Schk.* Culms 4 to 6 inches high, flowers in May. Open woods, Germantown. *Frank.*

C. multiflora, *Muhl.* Culm 2 feet high, flowers in June. Wet meadows, Cincinnati. *Frank.*

C. conoidea, *Schk.* Culm a foot high, flowering in June. Shady woods and wet meadows, Cincinnati. *Frank.*

C. pubescens, *Muhl.* Miami country. *Frank.*

C. granularis, *Muhl.* Cincinnati. Germantown. *Frank.*

C. arida, *Torr.* Dry pastures, Cincinnati. Germantown. *Frank.*

C. gracillima, *Schw.* Culm 18 to 24 inches high, flowers in May and June. Grows in open woods, Germantown. *Frank.*

Filices.

Polypodium phlegopteris, *Linn.* Pale mountain polypod. On a steep, shaded, sandstone hill-side. Dry saw-mill, Newark.

P. dryopteris, *Linn.* A most delicate triangular fern, perennial, root creeping, black, small; stipe 6 to 10 inches high; in fruit in July. With the last, Newark.

Woodwardia virginica, *Willd.* (?) The stipe of this tall, rank fern, is dark below; it grows plentifully in the tamerack swamps of the Western Reserve, to the height of 3 to 5 feet. In fruit in July and August. Accords with Beck's description (Bot. 454) in all but the following particulars: Pinnæ lance-linear, instead of lanceolate; segments obtuse, instead of acute; stipe chaffy near the root, instead of smooth. Beck says the W. virginica is 2 feet high; Eaton says 1.

Aspidium dilatatum, *Willd.* A perennial fern, 2 feet high, in

fruit in July, growing in shady woods, Western Reserve. Webbsport.

A. noveboracense, *Willd.* Perennial, frond 18 inches high, fruit or sporules mature in July and August. Gregarious, growing in damp woods, Newark and Webbsport. Compares with a specimen taken by Dr. Torrey, from the vicinity of New York.

A. angustum, *Willd.* Perennial, mature in July, growing in meadows etc., to the height of 18 inches. Meadville. *Buchanan.* Massillon. Cincinnati.

A. filix-fæmina, *Willd.* Perennial, frond 18 to 24 inches high, growing in low shady grounds. Specimens from Meadville, procured by Mr. Buchanan; from the neighborhood of Cincinnati, by Mr. Lea.

A. spinulosum, *Willd.* (?) Having entertained some doubt in respect to this species, at the time of publishing the Synopsis of Western Plants, and having never met with it except in the low, damp forests of central and north-eastern Ohio, I am induced to add the following description: *Stipe* and *rachis* chaffy, the latter rather longer of the two; *frond* bipinnate, general outline lance-oblong, glabrous; *pinnæ* sub-opposite, from 12 to 20 pairs; lower ones triangular from the prolongation of their lower pinnules, as large, though not as long as the middle pinnæ; upper ones lanceolate; *pinnules* lance-oblong, decurrent, often deeply gash-pinnatifid; *segments* often oblong and oval, with from 3 to 7 appressed, mucronate serratures; *sori* round, large, (intermediate between those of A. dilatatum and of A. marginale,) distinct, equidistant from the midrib and margin, corresponding to the segments or their serratures, and seldom if ever occurring on the lower pinnæ. Frond generally 16 inches long, and 5 or 6 in width, of a dark green color. Grows in damp, shady woods, in colonies of four or five, to the height of more than 2 feet.

A. intermedium, *Willd.* (?) The specimens which I have hesitatingly referred to this species, were found near Marietta, and by Mr. Buchanan near Meadville, Penn. *Fern*

2 feet high, *stipe* somewhat chaffy, *frond* lanceolate, almost lance-linear, hardly bipinnate; *pinnæ* lanceolate, deeply pinnatifid, *pinnules*, if they may be so called, linear-oblong and obtuse in outline, serrate with every second or third gash deeper, the pinnules next the rachis, on the lower pinnæ, are nearly or quite distinct, thus rendering the frond to the same extent bipinnate; *sori* oval, large, arranged in rows on each side of the midrib of the pinnule, becoming confluent; *indusium* opening inwards. This species differs from what I have taken to be the A. dilatatum, in having the sori oval instead of round, in being circumscribed by a much narrower outline, and in being hardly bipinnate, while the latter is often clearly tripinnate. Moreover, the A. dilatatum has mucronate serratures, which this species has not. The three admitted species, A. filix-fæmina, A. asplenoides and A. angustum, much more closely resemble each other, than do these two.

Dicksonia pilosiuscula, *Willd.* Frond 2 to 3 feet high, yellowish green, sori mature in July and August, gregarious. Grows in arid, argillaceous soils. Columbus. *Lapham.* Slaty ravine, 2 miles north of Worthington. Habit much like that of Aspidium noveboracense.

Hypopeltis obtusa, *Willd.* Rocky situations, Roscoe. Chillicothe.

Osmunda claytoniana, *Linn.* Resembling osmunda cinnamonea, *Linn.* One to two feet high, in fruit in August; grows in marshy woods, Copley swamp, near Akron.

Lycopodiaceæ.

Lycopodium complanatum, *Linn.* Newark. Cleveland.

L. dendroideum, *Michx.* Ground pine. Damp woods, Cleveland.

L. lucidulum, *Michx.* Creeping, branches 3 to 5 inches high, perennial, grows in slaty ravines, Franklin co. *Lapham.* Western Reserve. L. annotinum has not been observed in Ohio.

Musci.

Sphagnum latifolium, *Brid.* Peat moss. Color pale green, yellow and reddish, stem 6 to 12 inches long; spread like a bed or carpet over the shaking bogs, Western Reserve.

Splachnum setaceum, *Brid.* ? Pale green. Similar to the last in habit, size, and location, though preferring the shaded to the open bogs. Akron.

Hepaticeæ.

Riccia fluitans, *Linn.* Fork stems. Floating on water, dichotomously branched, green, having some resemblance to Lemna trisulca. Shaded pool 2 miles north of Newark, Knox co. Found in July.

CATALOGUE OF PLANTS LATELY FOUND IN THE STATES BORDERING ON OHIO.

Those species published by Dr. Short, in the Transylvania Journal, as having been discovered by himself and Mr. Griswold in Kentucky, are not included. This list, as will be seen by inspection, has been greatly augmented by the contributions of A. Clapp, M. D. of New-Albany, Ia., on whose accuracy reliance can be placed.

Cnidium canadensis, *Spreng.* (?) *Stem* 12 to 18 inches high, flexuous; *leaves* pinnate, 6 or 8 pairs, leafets gash-pinnatifid, or gash-toothed, lance-ovate; *general involucre* 4 or 5 leaved, linear, sometimes trifid; partial one 6 to 8 leaved, linear, ovate; *petals* white, nearly obcordate; *rays* of the umbels and umbellets corresponding in number generally, but vaguely, with the leaves of the general and partial involucres. Growing in water, Bronson, Michigan. Specimen from Mr. Williams of Buffalo.

Ranunculaceæ.

Ranunculus prostratus, *Eat.* R. clintonii, *Beck.* Not rooting at the joints. On rich grounds periodically inundated, New-Albany, Ia. *Clapp.*

Hypericineæ.

Hypericum petiolatum, *Walt.* Perennial, flowers dull red,—in August, stem 2 feet high, grows in wet places, New-Albany. *Clapp.*

Rosaceæ.

Potentilla arguata, *Pursh.* Flowers pale yellow. Indiana. Specimen from Mr. Dunbar of Indianapolis.

Pomaceæ.

Aronia latifolia, *mihi.* *Leaves* broad oval, nearly orbicular, cordate and subcordate at base, (excepting those at the extremities of the branches,) dentate-serrate, entire at base, abruptly acute or sub-mucronate at the apex, about two and a half inches long and two inches wide, upper surface glabrous, under surface near the base tomentose; *petioles* an inch long, tomentose; *racemes* few-flowered; *calyx* superior; *sepals* 5, ovate cuspidate, tomentose; *petals* lance-linear, ? obtusish, ? much longer than the sepals: *stamens* 20, ? arising from the calyx; *styles* 5; *pome* globose, 5-celled, each cell 2-seeded, some of them abortive; *seeds* smooth, oval, compressed, hooked at base. A shrub 6 or 8 feet high, with brown, punctate branches, growing among sandstone rocks, near the summit of Dupuy's knob, Ky., a mile south of Portsmouth, O. Observed in June last, when the immature fruit was as large as peas, and the crisped remnants of petals were rarely to be found. This may prove synonymous with Pyrus ovalis, *Linn.*, or P. sanguinea, *Pursh.* I propose a temporary name, accompanied with the above description, with a view of eliciting truth.

Leguminosæ.

Hedysarum canescens, *Linn.* H. scaberrimum, *Ell.* Four feet high, flowers in August. North shore of the Falls of the Ohio. *Clapp.*

Amorpha canescens, *Nutt.* Lead plant. Bronson, Michigan. Specimens from Mr. Williams, of Buffalo. Indianopolis. Specimens from Mr. Dunbar.

Cupuliferæ.

Quercus triloba, *Linn.* Downy black oak. Twenty feet high. Knobs, Greenup co., Ky., with Pinus variabilis.

Q. rubra, *Linn.* Red oak. Large tree, quite frequent in moist, rich, rather wet soils, New Albany, Ia. *Clapp.*

Q. catesbæi, *Michx.* Barren scrub oak. A shrub, growing on the knobs and barrens back of New Albany, Ia. *Clapp.*

Betulineæ.

Alnus glauca, *Michx.* Black alder. Meadville, Penn. *Buchanan.*

Salicineæ.

Salix petiolaris, *Willd.* A small tree, 6 or 8 feet high, flowering in April, growing at the head of Sandy Island, near New Albany. *Clapp.*

Geraniaceæ.

Geranium robertianum, *Linn.* Herb robert. Annual, 10 or 12 inches high, flowers small, purple, appearing from June to October. Plant fetid, growing in rocky shaded places, Meadville, Penn. *Buchanan.*

Polygaleæ.

Polygala cruciata, *Nutt.* Annual, flowering from July to September, flowers greenish purple. Six to twelve inches high, growing in wet places, Bronson, Michigan. Specimens from Mr. Williams.

Violaceæ.

Viola hastata, *Michx.* Ten to twelve inches high, flowers yellow, appearing in May. Morgantown, Va. *Paddock.*

Campanulaceæ.

Campanula rotundifolia, *Linn.* Flax bell-flower. Perennial, a foot high, flowers blue,—in July, grows in rocky situations, Bronson, Michigan. *Williams.*

Compositæ.

Sonchus carolinianus, *Walt.* Annual, flowers yellow,—in

August, 2 feet high, growing in fence corners in fertile soil, New-Albany. *Clapp.*

Lactuca sagittifolia, *Ell.* Growing in fields of second-rate land, New-Albany. *Clapp.*

L. sanguinea, *Bigelow.* Flowers rather later than L. elongata, grows in fields, rare, New-Albany. *Clapp.*

Aster patens, *Ait.* (Beck, 183.) Perennial, 18 inches high, flowers in July and August. Dry sandstone knobs, New-Albany. *Clapp.*

A. sagittifolius, *Willd.* Two feet high, flowers blue,—in September and October, rare, growing on the banks of streams. New-Albany. *Clapp.*

A. rigidus, *Willd.* Perennial, 10 to 18 inches high. A well-marked species, growing in dry barrens, New-Albany. *Clapp.*

Solidago gigantea, *Ait.* Flowers in August, grows 5 feet high, in moderately fertile soils on high grounds, New-Albany. *Clapp.*

S. glomerata, *Michx.* Flowers in September, grows 18 inches high, on dry, sterile knobs, New Albany. *Clapp.*

S. altissima, *Linn.* A robust species, growing 5 feet high, in a meadow near New-Albany. *Clapp.*

S. rupestris, *Rafinesque.* (Where described?) Flowers in September, 16 to 18 inches high. Rocky situations, north bank of the Falls of the Ohio. *Clapp.*

Eupatorium trifoliatum, *Linn.* Flowers white,—in September, growing in woods among the knobs, New-Albany. *Clapp.* Western states. *Beck.*

E. serotinum, *Michx.* Flowers white,—in September and October, 3 to 4 feet high, growing on the banks of sandy rivulets, New-Albany. *Clapp.*

Helianthus divaricatus, *Linn.* Grows 5 or 6 feet high, in fence corners, etc., New-Albany. *Clapp.*

Stellatæ.

Galium boreale, *Pursh.* Bronson, Michigan. *Williams.*

Polemoniaceæ.

Phlox acuminata, *Pursh.* Flowers purple,—in August. Grows 3 to 5 feet high, in fertile soils, New-Albany. *Clapp.*

Solaneæ.

Solanum virginianum, *Linn.* Flowers bluish-white, stem 18 inches high, growing on river banks, New-Albany. Rare. *Clapp.*

Labiatæ.

Salvia urticifolia, *Linn.* Nettle-leaf sage. Growing among knobs, Ia., 5 or 6 inches high. Rare. *Clapp.*

Pycnanthemum monardellum, *Michx.* Perennial, growing from 2 to 3 feet high, flowers whitish-red,—in July. Morgantown, Va. *Paddock.*

Stachys hyssopifolia, *Michx.* Perennial, stem 8 to 12 inches high, flowering in July and August. Borders of wet meadows, Prairie Ronde, Michigan. Specimens from Mr. Williams.

Borragineæ.

Lycopsis virginica, *Linn.* (?) Found with mature seed, about the middle of June, on an arid knob, Greenup co., Ky. Annual, whole plant hispid; *stem* erect, 6 inches high, branching; *leaves* lance-oval, obtuse, half an inch long and two inches wide, sessile, lower ones obovate; *flowers* in long terminal racemes; *pedicels* as long as the calyx; *teeth* of the calyx lanceolate, acute, not closing; *seeds* ovate, lenticular, margined, smooth and shining.

Lithospermum officinale, *Linn.* Common gromwell. One to two feet high, flowers pale yellow, growing on argillaceous hill-sides, New-Albany. *Clapp.* Introduced.

Orchideæ.

Pogonia ophioglossoides, *Brown.* About Coneaught lake, Penn. *Buchanan.*

Melanthaceæ.

Veratrum viride, *Ait.* Poke root. American Hellebore. Neighborhood of Meadville, Penn. *Buchanan.*

Tofielda pubescens. *Pursh.* Perennial, 18 inches high, flowers in July, grows in marshes, Bronson, Michigan. *Mr. Williams*, of Buffalo.

Smilaceæ.

Smilax sarsaparilla, *Linn.* Stem climbing, 2 to 3 feet high, leaves glaucous, growing in barren fields, New-Albany. Rare. Not the commercial sarsaparilla. *Clapp.*

Convallaria biflora, *Walt.* Grows in moist, rich meadows, flowers in May and June, attains the height of 18 inches. New-Albany. *Clapp.*

Gramineæ.

Agrostis virginica, *Linn.* Culms procumbent, a foot high. New-Albany. *Clapp. Griswold.*

Panicum hispidum, *Muhl.* Culm 3 to 4 feet high. New-Albany. *Clapp.*

Avena præcox, *Linn. Eat.* Dwarf oats. An interesting little annual, 6 to 12 inches high, flowers in May and June. Grows on high, arid, sandstone knobs, with Pinus variabilis and Rhus copallina, Greenup co., Ky.

Filices.

Botrychium simplex, *Hitchcock.* Frond ternately bipinnatifid, gashed; spike decompound. Perennial, 6 inches high, growing in pine woods, Meadville, Penn. Specimens from R. Buchanan, Esq.

Art. IV.—Hydrophobia.

History of a fatal case of Hydrophobia, with an account of the appearances after death. By Otho M. Herron, M. D., Resident Physician of the Commercial Hospital of Ohio.

Daniel Wonderly, a laborer, aged 23, was admitted on the evening of February 15, laboring in the second stage of Hydrophobia.

Symptoms etc.—Eyes widely opened, giving him a wild and alarmed expression. Pulse soft, slow, rather small, and 80. Tongue slightly coaked in the centre, margin red. Skin moist. Respiration natural. Great aversion to the sight of water. When urged to drink some, insists upon having it brought up behind him. He then reaches around for the cup and swallows in the utmost haste and terror. The lower jaw is in continued motion, as if to retain its mobile condition, and resist spasm. Fauces dry, and, perhaps, of a little deeper red than natural. Conjunctiva of the right eye injected. Eyes moist. When questioned as to the seat of his distress, he could give it no definite location. Says his head is clear, and no tenderness of the thorax or abdomen could be detected. At the time of his admission he could articulate, but his voice was extremely hoarse. His voice diminished into a whisper, which ultimately subsided into almost perfect aphonia. Insane at intervals, with slight convulsive paroxysms. Tart antimony was given in divided doses, every 15 minutes, until he took gr. viij., but without apparent effect. Chlor. Hyd., gr. xxx., and G. Opii, gr. iij., repeated every two hours. 16.—No visible change. The principle internal medicines used to day, in addition to the above, was extract Belladonnæ, gr. j., every hour; but no narcotic effect was induced. At 4, P. M., a discharge of saliva commenced from the mouth which increased. He made continual, but ineffectual attempts to throw it from him. At between 6 and 7, P. M., his pulse was feeble and hurried, respiration labored, and 40. The disorder of the respiration seemed more like the effect of *fear* than of disease. Urinary evacuation copious. A sour and peculiar effluvium emanates from his body. Eyes of a light green color, and swimming in moisture; opened to the utmost; the conjunctiva of the right one highly injected, and the pupil dilated more than the left. Sees the surrounding objects distinctly enough. Expresses extreme concern for his wife and family. Calls most piteously upon his Maker to relieve him, and entreats those around to kill him out of his torment. His brother-in-law came in at

8 o'clock,—recognised and spoke to him as soon as he entered the room. At this time his countenance was expressive of the most excessive fright and horror. Calls piteously and perpetually upon heaven for relief. Respiration within the last two hours accelerated in frequency, (not counted,) is not more labored than previously but the inspirations are diminished in quantity, and seem as if confined to the superior pulmonary lobes. Spumous discharge from the mouth increased. He died at ten o'clock, this evening. It is impossible to conceive a more frightful picture of anguish than was presented in his case. There were but occasional aberrations of intellect; so, that with the utmost imaginable suffering, there was combined a consciousness almost perfect.

Post. Mortem. (Eighteen hours after death.)

Countenance distorted into an agonized expression.

Head. The scalp was removed without the loss of a drop of blood. Two ecchymosis about the size of a shilling on the parietal bone of the right side near the junction of the coronal and saggital sutures. Supposed to have been produced by external wound. Dura mater healthy. The longitudinal sinus contained the usual quantity of venous blood. Arachnoid. No perceptible lesion. Pia mater. The vessels upon the surface of the left hemisphere considerably distended. Those on the right less so. Cerebral substance somewhat softened. Upon making a section, the cineritious matter presented an ordinary appearance as to color and depth. The medullary studded with innumerable red points. The ventricles contained a small quantity of reddish serum, perhaps in all 5 or 6 drachms. The choroid plexus of a darker brown and more granular than natural. The vessels of the velum interpositum were very unusually distended. Corpora striata and optic chalami presented no abnormal appearance save the *ramollessiment*, which was common to the whole structure. Pineal gland a shade darker than natural; the color was a pretty good purple. The tubercula qudrigemina, corpora albicantia, petuitary gland and pons varolii were carefully examined, but exhibited no diseased aspect differing

from that of the cerebrum in general. The cerebellum less consistent than the cerebrum. I believe this is invariably the case in fresh subjects. The cineritious substance of a brighter red than that of the cerebrum.

The medulla spinalis was cut off as low down as it could be reached with the knife, and examined with all possible care, but no morbid appearance could be seen. Thorax. Both lungs exceedingly engorged, so that there was scarcely a perceptible collapse when the sturnum and costal cartilages were removed. No adhesion. No effusion into the cavity of the pleura. Emphysematous vesicles in several places upon the exterior surface, but most numerous in the interstices of the lobes. A small effusion of lymph at the lower border of the inferior lobe of the right lung. Effused a reddish serosity when incised. Heart sound. Large arteries sound.—No escape of air from them.

Trachea and bronchia. The lining membrane at the upper part of the trachea was pale and tumified. The pouches of morgagni filled up, and the parts in the immediate region so swollen as to destroy the possibility of healthy function in this part, and to account clearly for the difficulty in articulating. At about two-thirds of the way down the trachea, the membrane abruptly assumed a dark brown color, and was covered with a layer of tenaceous mucous, colorless on the surface, but having beneath, a reddish lymphatic secretion, which gave the membrane its peculiar hue. This adhered firmly to the membrane, which was easily abraded by a scrape of the scalpel. This disorganization was traced into the most minute ramifications of the bronchia that could be examined.

Pharynx. At the upper part, the mucous membrane arid, and extremely pale. Towards the middle, the caliber exceedingly contracted—the handle of a small scalpel was passed down with difficulty. At this part, the membrane is traversed by numerous longitudinal corrugations, and incrusted by a stratum of doughy albuminoid matter of such a consistence as to be rolled into little cylinders between the fingers. At

the portion lying contiguous to the larynx, this crust had a dark discoloration. Beneath this part, which embraces, perhaps, three inches, the pharynx gradually assumes its natural aspect.

Stomach. About a gill of green and foetid fluid in this viscus. A number of round excavations were scattered over the surface of the mucous membrane, from the size of a pin head to that of a large pea; most numerous towards the pyloric extremity of the greater curvature, and not having an appearance of recent ulceration.

Liver, Spleen, Kidneys and small intestines healthy. Colon and Rectum have the well marked traces of an old diarrhœa. Bladder healthy and empty.

The par vagum was carefully and minutely examined, and presented no diseased aspect either in the neurilemma or fibre.

Glands. Sublingual, Parotid, and submaxillary, exhibited no trace, whatever, of morbid change.

Considerable pains were taken to obtain an accurate history of the case up to the time of his admission. The following are the facts that may be relied upon, as related by Mr. Brown, the employer of the patient, and several of his relatives, all of whom live between three and four miles from the city. On the 22d January, the patient was bitten near the metacarpal joint of the little finger, by a small female lap-dog. It was so unusual an occurrence, as to excite suspicion. She was watched and observed to bite a puppy not long after. The puppy was confined, went mad in nine days, and died.—No mad dog had been heard of in the vicinity for years, besides this one. He applied, soon after his bite, to a *steam doctor;* next tried the *mad stone;* next posted off to an *Indian doctor,* living at a considerable distance, and finally sent for a *regular doctor.* After subjecting himself to the multifarious and diverse plans of treatment prescribed successively by his doctors he believed he was safe, and went to his regular employment. Up to this time, he felt no symptoms that alarmed him except a *vertigo,* which visited him almost daily, until a

short time previous to the attack. He worked for a few days; but on the 21st he felt a *dull pain*, in the wound, at the point where he was bitten. This gradually ascended the arm, communicating a sensation of dull heavy uneasiness, entered the body, and was then felt in like manner through the left side, and finally throughout the body. He now, (the morning of the 22d day,) first manifested the pathognomonic symptom—abhorrence of water. He came to the Hospital four days after the invasion of the second stage of the disease.

The true nature of the hydrophobic virus has long been a subject of interest and speculation. The experiments of Magendie and Breschet demonstrate the fact, that the peculiar poison which gives rise to this disease is contained in the salivary secretion which is so abundantly discharged from the mouth of the patient. They inoculated two healthy dogs with the saliva from the mouth of a dying patient, one of which became rabid in 44 days, and the other in 75. The specific virus of rabies is mixed in some manner with the saliva, but no analysis has, as yet, been equivalent to its demonstration. In a practical point of view, its discovery is infinitely less desirable than that of its antidote. Our microscopic school of philosphers would doubtless regard it as unequivocally *animalcular*, as they do the proximate cause of variola, yellow fever, and all other diseases. Why is it that the hydrophobic virus, in like manner with that of most other diseases, may pass, harmless, through all other parts of the animal structure, and exert its terrible morbific agency upon particular organs?—it is indubitably certain that there exists a correspondence between certain poisonous substances that pervade the kingdoms of nature in various forms, and particular organs and functions of the animal system; and that in this correspondence lies the deep secret of the *specfiic* agency of the morbific as well as curative substances; and hence, the Homœopathic system is pregnant with at least one truth that is of the utmost importance in medicine. This correspondence of the active ingredients of nature with the various structures and functions of the human system presents an

arena for the research and labor of medical *savans* which is beginning to be traversed with hopeful assiduity.

The fear of water, and, at the same time, the desire to drink *may be physically* and pathologically accounted for by the morbid appearances on dissection. We have a portion of the pharynx exceedingly dry, and, at the same time, so contracted and disorganized as to prevent deglutition. Death, in the preceding case, resulted from the pulmonary congestion, attended by the diseased condition of the lining membrane of the air passages.

How far the disorganization of the stomach was connected with the original disease is extremely uncertain.

If the inflammation of the pharynx was a consequence of its contiguity to the larynx, why were not other contiguous parts involved?

Is it highly probable, that the brain suffers in this disease only symptomatically?

Art. V.—Physiology.

Animal and Vegetable Physiology, considered with reference to Natural Theology. By Peter Mark Roget, M. D., Secretary of the Royal Society, Fullerian Professor of Physiology in the Royal Institution of Great Britain, Vice President of the Society of Arts, Fellow of the Royal College of Physicians, consulting Physician to the Queen Charlotte's Lying-in Hospital and to the Northern Dispensatory, etc., etc. Philadelphia: Carey, Lea & Blanchard—1836. 2 vols. pp. 871.

By the Junior Editor.

Among the great variety of physiological works presented to us by late writers, few possess more merit than the one we are about to notice. It is true it contains little or nothing that is new, yet it gives a comprehensive digest of the present state of the science, in a plain and elegant style not often found in works strictly scientific. It is also free from the great exuberance of technical terms which frequently mar the pages of our professional works, especially those of the older writers.

Although Physiology is certainly the basis of a correct Medical Education, yet its study is too exclusively confined

to the profession. Elementary works on this department of philosophy should be introduced into our primary schools, and their study as much enjoined upon the pupils, as that of the various books on natural, moral, or mental philosophy. Why should man remain ignorant of himself while he pushes his researches into the structure and modes of action of that which surrounds him? Nothing, perhaps, would more enable him to resist the effects of noxious agents, or to preserve himself from the swarms of empirics which infest both city and country. Although this work is not designed for the school-boy, still we are glad to find it in the hands of the extra-professional reader. As it is written with a special reference to Natural Theology, it will doubtless be useful wherever found, either as a theological or philosophical work.

Our author commences with an introduction on the final causes of organic action. Here he notices the relations existing among the various phenomena of living matter, of which the mind has cognizance. The laws of nature are nothing more than the uniformity, which takes place in the succession of events, and can only be discovered by a careful study of the circumstances, which regulate the phenomena of nature, whether vital or physical. Nature is every where connected, either by cause and effect, o. eans and end, and the unknown links which unite both are termed the powers of nature. In mechanical philosophy, these powers are called forces. It is a *law* of nature, that where a body is projected from the earth, it will immediately return to its surface, unless sustained by an opposing agent, and attraction is the controlling *force*. It is also a law of nature, that organic action must cease without a circulation of fluids, and the powers which accomplish this circulation, reside in the various tissues, of which the organ is composed.

Our author occasionally advances doctrines, similar to those of the older philosophers. In the introduction, which we have just mentioned, he affirms that the embryo of an organic being, contains within itself, the rudiments of the future vegetable or animal structure, and that the process of nutrition does nothing

more than fill up the outlines, already sketched on the living canvass. We think that the best microscopic observations, will not confirm this doctrine, for although the embryo contains the rudiments, or rather the elements of the future animal, still the most imperfect outlines can never be traced in the ovum. It is made up of a homogeneous mass, differing in the various species, according to the place the parent occupies in the scale of organization. Darwin, in the heat of his poetic fancy, advocated the doctrine our author contends for, but his followers were forced to abandon it in this particular at least. Perhaps no subject in physiology is more involved in obscurity than that of nutrition, and it is especially so when we refer it to the primary formation of the animal or plant. We are aware that every animal, however exalted, springs from a given point, a mere atom of matter, but the refined power which draws other material particles to its aid, and endows them with a kind of associate or instinctive feeling, which causes them to unite, until the assemblage is complete, and the entire mass is endowed with sensation, motion, and intelligence, will probably remain forever in obscurity, or be revealed only to finer sensibilities than those of man.

In the first volume, Dr. Roget treats, especially, of the mechanical functions concerned in the process of organization. He commences with the lowest order of life, and traces the peculiarities of each, through all the genera and species of plants and animals, until he arrives at man himself. His chapters on the organization and development of vegetables, are among the most valuable portions of the work. This department of physiology, is too much neglected by the writers of the present period. Few, even among medical philosophers, study the peculiarities of vegetable organization, although it constitutes the basis of a sound physiological education.

The principal parts of the plant are the root, stem, and external covering.

The most elementary texture of vegetables, consists in transparent vessicles of a circular or rather oval form, arranged in an irregular order, and connected together by the

walls of the cells. These cells, however, vary both in shape and size, in different specimens, and at different periods in the same specimen. Sometimes they are round, at others they appear like hexagonal prisms resembling the cells of honey-comb. Their diameters also vary from the 30th to the 1000th of an inch, but the medium size is about 1-12th of a line, or 150th part of an inch. Some writers have attempted to class these cells according to their shapes and sizes in different plants, but such classifications can never throw any light on vegetable physiology.

It is a disputed point whether the cells are open or closed, but the truth cannot be easily ascertained, for although they are sometimes filled with fluids, the microscope has failed to reveal to us the passage through which they enter. It is more than probable that they pass through the walls by means of the endosmosis of Dutrochet. As the cells are circular, oval, or prismatic, there must necessarily be a number of intercellular spaces existing between them, which perform an important part in the nutrition of vegetables.

The fluids in both the cells and intercellular spaces differ essentially in the arrangement of their proximate elements. In some instances they are filled with a simple watery fluid, in others with a vegetable secretion, and in others with air alone. The sap of vegetables, unlike the blood of animals, contains some of the proximate elements of the plant in a visible form, of which fecula is the most common and easiest discovered. We have before us the stem of a plant in which we can see, by the aid of a good lens, particles of a dark color, completely detached from the walls of the cells, but whether they are fecula, lignin, or some other agent, we cannot possibly determine. Our author observes, that the coloring matter of leaves and flowers can frequently be detected in their vessels, another proof that the salts, etc., of the body may exist in the blood, uncombined with other agents.

The vessels of plants are various. Sometimes they form spiral tubes, at others they are mere continuous capillaries, and at others they are open vessicles, connected together like

rows of beads. In some instances they contain fluids, but mostly air; which is of as much importance in vegetable as animal life. In some plants, especially of the aquatic kind, the air-cells are so large that they contribute much to their buoyancy.

Besides cells and vessels, plants contain a number of other organs, such as glands, which separate the resinous and other productions of plants from the fluids which enter into their structures. But time will not permit us to enter into a more minute analysis of our author's chapter on vegetable organization. It is of much interest to the student of nature, and one that contains more on that subject, than can be found in three times the number of pages in any work with which we are acquainted.

In relation to the development of vegetables, it appears that the growth takes place in two modes; the one by additions to the external parts of the plant, the other by successive growths from the internal surface. The former is termed *Exogenous*, and the latter *Endogenous* plants. The first embraces the oak, elm, beech, and buckeye, together with the great proportion of our northern trees and shrubs, while the last includes the principal part of the growth of southern climates, such as the Date, and Cocoa-nut tree, together with the sugar-cane, and other similar vegetables.

The endogenous growth, of which the palm tree affords a good example, is the most simple. The stem extends to a great heighth, and instead of dividing into branches, terminates abruptly in a tuft of leaves. The first stage of the growth consists in a circle of leaves which shoot upwards from the neck of the plant, and attain during the first year a certain size. The following year another circle of leaves arises, but they grow from the interior of the former circle, which they force outwards as the vegetation advances, and as ligneous matter is deposited. When the external portion of the stem becomes sufficiently hard to resist the pressure from within, the central layers are pushed upwards, and the plant is annually elongated. Decandolle compares this de-

velopment to the drawing out of the sliding tubes of a telescope. At the close of the season the leaves fall off, and leave the traces of their former existence, by a circular impression upon the stem. The age of the tree may readily be determined by the number of these circles or knobs. Endogenous plants have neither bark, pith, nor concentric layers.

The structure of exogenous trees, is much more complicated, for when fully grown they are composed of wood and bark, which is again subdivided into various parts. The wood consists of *pith* or medulla, harder wood, surrounding the pith in concentric layers, and external softer wood, or *alburnum*, which is also formed in concentric growths on the outside of the former. The bark is divided into the *Liber* and *cellular envelope;* the external part of which is termed *Epidermis.* All of these various layers, together with the *medullary rays* radiating from the pith to the circumference, may readily be distinguished by a horizontal section of the stem.

Every vegetable stem, or every branch which arises from it, springs from a germ or bud of inconceivable minuteness, totally inappreciable by the finest lenses. When large enough to be discovered it consists of the various parts of which the plant is composed, folded up in the smallest possible circumference. The first year is occupied in woody plants, by the formation of pith, first layer of wood, and bark with which it is covered. During the succeeding years, the layers are annually formed on the outside of the wood, and inner portion of the bark, until the growth is complete.

The spiral growth of vegetables, forms one of their most singular features. It is more or less observable in every tree and plant, but especially in the vines, where it seems to be essentially necessary, enabling them to ascend the various objects within their reach, for the purposes of support and nourishment. It has been supposed by many ingenious philosophers, that this was the result of the action of the sun, on the plant, during the early period of its growth, but this supposition our author thinks cannot be supported.

The roots of plants perform the same offices in the

vegetable, that the lacteals do in the animal. They select the food from the soil, and convey it into the structure of the plant, by means of a capillary circulation. It is also more than probable, that they return a portion of the sap and vegetable excretion to the earth, after the sap has performed its various offices in the economy of the plants.

Besides the parts already mentioned, plants are furnished by a great variety of organs, of but little importance in their development. They appear in many instances to be designed as instruments of defence. The sting of the nettle bears a striking analogy in its structure, to the poisonous fangs of serpents.

Our author proceeds, in the next place, to notice the organzation of animal structures. Here he mentions the various tissues of which the animal is composed, and gives a detail of the properties of each, as well as the manner in which they are arranged in the organs of the body. In speaking of the muscular tissue, he observes, that the living body contains within itself, a principle of motion not referable, as far as we can perceive, to any of the primary forces which exist in the inanimate world. This principle has been termed *contractility.* In animals of the simplest structure, every part of the substance of the body seems to be equally endowed with this contractile property, although exhibiting no appearances of a fibrous structure. This is the case with all the zoophytes, such as the *Infusoria*, *Polypi*, *Medusæ*, and the simpler kinds of *Entozoa.* Here our author seems to think that a fibrous structure is not necessary in order to secure animal contractility; a doctrine at variance with the notions of some of the older physiologists. As a means of motion, however, contractility resides principally in the muscular tissue, even in the lower order of animals. In these the muscles are not always attached to bones, but frequently adhere to the external integument which increases the mobility of the animal.

He observes that there exists no traces of muscular contractility, in any of the vegetable tissues, but this assertion seems to be opposed by many of the phenomena of plants,

for some vegetables evidently possess considerable motion in their branches and leaves, when irritated by external agents.* It is true this motion may vary essentially from that produced by muscular contractility, yet the resemblance between them must forcibly strike the mind of the observer. The remainder of the chapter on muscular motion, though well written, possesses but little that is new or interesting, except to those who have not studied the subject. His positions are the same with those of Bostock, Majendie, and other standard writers on physiology.

The next chapter is one of interest, and contains much that is new to those who have never studied comparative anatomy. It treats of the mechanical functions in *Zoophytes;* the first departure from mere vegetable life in the scale of animal organization. Nothing can be more interesting to the philosopher, than to trace the various links which bind the organic world into one continuous whole. The class of animals which our philosophic author is about to notice, is so intimately associated in its mechanical functions, with that which we have just passed, that it is still a disputed point as to the propriety of separating them. They, however, doubtless form distinct departments in nature, and should be studied as such, although they have much in their arrangement common to both.

The most simple form of animal life is confined to the water, where it is constantly supported by a hydrostatic pressure, almost equal to the attraction of gravity; hence the simplicity of its mechanical structure, an erect position being altogether unnecessary. Some of the Zoophytes or animated plants, are equally as destitute of motion as the vegetable, being fixed by a kind of pedicle, to the rocks, upon which they are placed. The *Porifera*, or sponges, a class of animals abounding in every part of the ocean, from the shores of Greenland to the coasts of Australia, are of this species. In their general appearance, they resemble plants, but their internal

* The leaves of the *Mimosa pudica*, and the *Dionaea muscipulata* move with facility when irritated. The same is true of the leaves and stamina of many other plants.

organization differs from any vegetable structure. They are composed of a soft flesh, intermixed with solid and tubular fibres. The solid portions are horny, and contain large quantities of nitrogen, an element seldom found in vegetables, together with a kind of silicious or calcareous deposit. This fibrous tissue may be said to form the skeleton of the animal, for the fleshy portion is so tender, that the slightest force is sufficient to tear it asunder, and thus permit the fluids to escape. When examined by the microscope, the soft flesh is found to contain a great number of minute grains, suspended in a transparent jelly. This gelatinous substance was said, by the older writers, to contract upon the application of irritants, but our author thinks this opinion unsustained by recent observations. With due deference, however, to the high authority which he quotes, we must still think that sponges contract upon the application of their peculiar stimuli. We cannot otherwise explain the currents of water which are constantly issuing from their interior, for the animals no sooner die than the streams cease. Roget thinks that the currents are occasioned by innumberable fibrils, or *cilia*, placed within the interior canals, but he acknowledges that these cannot be detected even by the aid of the best microscopes. We, however, think it more probable, as well as more philosophic, to consider these living fountains as the offspring of a peculiar animal contraction, especially as the impetuous torrent is the means of furnishing the animal with its usual quantum of food.

Sponges are propagated by means of *ova*, or small buds without envelopes, which are thrown off from the body of the parent at different periods. At first they are loose, and float in various directions through the medium, in which they are placed, until they are attached to the rocks, when they commence their growth. Our author mentions many singular circumstances in relation to the growth of the sponge, which we have not time to enumerate. They all prove it to be a regularly organized animal, with habits and instincts peculiar to itself.

Passing by the remarks of our author on *Polypifera*, a species of animals differing but little from sponges, we come to his observations on the *Infusoria*, a family of animals imperceptible to the naked eye. Unlike the order already mentioned, these minute beings are not fixed to any particular spot, but are found in multitudes in all infusions of animal or vegetable matter, which have been kept for a sufficient time. Their forms can only be, in general, detected by the microscope, although some of them are sufficiently large to be visible to the naked eye. The infusoria, however, are divided into a great variety of species; some of them so extremely small, that a single drop of water contains nearly five hundred millions; a number equal to that of all the human race, yet these living atoms appear to be in the possession of habits and feelings, peculiar to themselves! Indeed professor Ehrenberg, has recently found that they are furnished with internal cavities, for the reception of food, and he thinks it probable that they are also endowed with a muscular, a nervous, and a vascular system. Some suppose that the contagion of small-pox, measles and other specific diseases, is composed of minute animated beings, similar to those we have just mentioned. An ingenious paper on this subject, may be found in the last number of our Journal, by Dr. Riddell.

The infusoria vary much in shape as well as size. Sometimes they are cylindrical, like the *vibrio*, or vinegar eel, at others they are round, flat, stellated, or horny like the *Volvox globator*, or *Proteus*.

A great variety of other animals belonging to the Zoophyte family, are investigated in the chapters following those we have mentioned. We shall, however, be compelled to pass them by for the present, in order to notice what is said on the *Mollusca*.

Although this class is not necessarily fixed, still it embraces but few species that are endowed with the power of locomotion. It is true that many bivalves change their places, but this is accomplished by rapidly closing their shells, by means of a muscular apparatus, which gives an impetus to the

animal, by forcibly expelling the water contained within its calcareous coverings. The structure by which this is accomplished, is the principal part of the chapter we shall notice. The valves of the shell of the muscle or oyster, for instance, are united at the back by means of a hinge joint, secured by a strong ligament, which is partly fibrous and partly cartilaginous. The cartilaginous portion is extremely elastic, and is placed within the joint, so that when the shell is closed it is considerably compressed. In this situation its elasticity contributes much towards the opening of the valves, by which means the water passes both to and from the animal, with perfect freedom. As it is necessary, however, for the safety of the animal, that the shell should be occasionally closed, it is furnished with strong muscular bands, which pass directly from one valve to the other. When this muscular apparatus contracts, the shell is closed with considerable force. An elastic ligament of peculiar structure, is also united with the muscle, and attached to the different sides of the shell, in order to prevent it from opening beyond a certain extent.

Some bivalves, as the *Cardium*, are furnished with a kind of leg, which they extend from between the edges of the shell, and which they use as an instrument of motion. It also enables them to burrow in the sand, either to seek for some article of food, or to conceal themselves from the attack of an invading foe. This process is undoubtedly, to a great extent, muscular, and although the animal is acephalous, it must have a kind of nervous endowment, otherwise it would be unable either to feel the sand in which it burrows, or to perceive the approach of danger.

But the most singular of all the mechanical functions of the *Acephala*, is the facility with which the *Pinna* or Marine Muscle, inhabiting the shores of tempestuous seas, will spin a kind of thread, like that of the spider, with which it can attach itself so firmly to the neighboring rocks, that the surge may dash against it, for any length of time, without being able to dislodge it from its moorings. Our author observes that these threads are so strong, that the Sicilians manufacture them into gloves, and other articles resembling silk.

The next grade of life, in the Mollusca, after we leave the Acephala, is the order *Gasteropoda*, which inhabit univalve turbinated shells. The snail is of this species. Although its motion is very limited, still it moves with more facility than the preceding. Its nervous organization is better developed, as may be seen by the lengthened horns or feelers, which the animal protrudes from its head, at will, for the purpose of exploring the path along which it travels.

Shells are formed by a deposit of calcareous matter upon their surface, from the skin, or in the language of late writers, *the mantle* of the animal. The deposit is fluid in the early periods, but it soon hardens into layers more or less dense, according to the class to which the shell belongs.

Although shells are formed by a process of organization, still they are not endowed with any of the vital properties, but appear to be mere appendages for the protection of the animals. They bear the same relation to the molluscous that nails and hoofs do to terrestial animals. The formation of shells at first view, seems to bear a striking resemblance to the growth of flat bones in the Mammalia, but upon a close examination, the processes are found to be essentially different. In the former the calcareous substance exudes from the mantle, beneath the epidermis, and between that tunic and the subjacent corium, being placed beyond the reach of any vascular apparatus as soon as it escapes, while in the latter the osseous materials are deposited, in a kind of cartilaginous mould, by a regular set of vessels, which remains as a part of the organization in order to replace such portions as may be removed by mechanical or other causes.

In univalves the growth of the shell is in a spiral direction, from left to right, which is said to be the result of the location of the heart and other vital organs. In some of the marine shells, this order is reversed, and the whorls run from right to left, hence they are termed *sinistral* or reversed shells.

There are many other interesting facts, mentioned by our author, in relation to the formation of shells, which we have neither time nor space to examine. We shall also be com-

pelled to pass by two or three families of mollusca, which present many curious and interesting phenomena, worthy the attention of the general physiologist. We shall, however, notice some of these, when we reach the department in which he examines the vital functions of the same animals.

We shall next examine our author's remarks on the *Articulata*, a tribe of animals which are said to be placed above the Mollusca, in the scale of life. We will here remark, however, that it is extremely difficult to determine, in many instances, the place the animal should occupy, for the most perfect specimens of a lower order, frequently appear to be better formed, than the most imperfect of that which is immediately above it. This is the case with the order we are about to examine — the *Articulata*.

The lowest division of articulated animals, comprehends the *Annelida*, or vermiform animals, of which the common earth-worm is a familiar example. Indeed it is questionable with us, whether this is any more complex in its structure, than the Mollusca, or indeed whether it is equally as much so as many of the most perfectly organized of the latter animals. It seems to us that a line drawn from the Zoophyte to the Vertebrated class, would entirely pass the one we are about to notice, or embrace only the most perfect specimens, as the various species of *Arachnida*.

In the Annelida the basis of the body is external, and consists of the integument that is composed of horny rings, which, when united, form a kind of cylinder in which the vital organs are located. These rings separate the body into different segments, each of which appears to be endowed with a kind of separate vitality, for the animal may be divided into different portions and still each retain a vital action.— This, however, is only the case with the lowest order of worms. All of these rings are connected by muscular attachments which move the animal by means of their various contractions. The alimentary canal, and indeed the whole of the vital organs including the circulatory, are of the most simple kind.

The next order which our author examines is termed the *Arachnida*, which embraces the different species of spiders, as well as a variety of other animals allied to them in conformation. In this animal, the rings which we have mentioned as forming the framework of the Annelida, are consolidated so as to form two principal parts of the body, the thorax and abdomen. These are separated by a deep groove which leaves only a slender tube of communication between them. The male is furnished with four pairs of legs, which are united to the thorax, while the female has five, the additional ones being for the purpose of enabling her to carry her eggs. Spiders cast off their external coverings at regular periods during their existence. Indeed this is common with all articulated animals, being the commencement of that series of metamorphosis which forms a leading trait in the winged insects. This little animal moves with great facility in various directions, and has been remarkable from time immemorial for its instincts in relation to the construction of its web and the destruction of its prey.

The *Crustacea*, the next species to which our attention is directed, possesses many singular faculties, and among them the power of reproducing, at pleasure, those parts which may have been lost or injured by mechanical causes. No sooner is an animal of this kind deprived of a claw than a growth commences upon the original stump which continues until the part is entirely restored. We have no examples of the restoration of lost parts in the higher orders of animals. In such instances the sprouting of the new claw resembles the budding of a plant. Reaumur supposed that this growth was the offspring of a concealed claw which remained within the body of the animal in the same manner that the secondary teeth are kept, for a given time, within the jaw of the child. There are, however, many objections to this hypothesis which cannot be overcome. Notwithstanding any part of the limb can be restored, yet it seems the growth is most rapid when the claw is broken off at the first joint. Indeed the animal frequently breaks it off at this point itself when it is injured

near its extremity. The Crustacea, like the former family of animals, cast off their coverings, at stated periods.

We would be much pleased to examine at length, the remarks of our author on insects, but the extent of the subject will prevent us from doing more than bestowing a very cursory notice on the most remarkable phenomena in their construction.

The growth of insects is subject to a long series of modifications, in their passage through the various intermediate stages of development, before their forms are perfected. In the early periods of their existence, they are compelled to travel over the surface of the earth, or to rise above it by following the stems of plants, or other vertical structures, but in their perfect state, they can mount upon the wing and travel through the air with great velocity, collecting their food from such flowers or plants, or other sources as their instincts may point out to them. Their state of perfection, however, is of but short duration. A few summer suns and their flight is arrested, for they no sooner deposit their eggs, than their life ceases. The whole series of metamorphoses is strikingly displayed in the history of the butterfly or moth tribe. In the first instance, we have an egg, then a worm, then a kind of tropid chrysalis, and then a beautiful insect, furnished with wings, and decked in all the varied colors of animated nature. As physiologists it is only interesting for us to know, that the most imperfect state of the insect, after it leaves the egg, contains the rudiments of the various organs of its complete development.—At each period of its existence it only throws off the garment which concealed its prior form. The wings and other organs are not complete, it is true, in the *larva*, yet they are constantly increasing in size, until the *chrysalis* throws aside its mask, and proclaims, by its development, its elevated rank among the lesser inhabitants of the globe.

The muscular tissue of insects has immense power in proportion to its development. Ants will carry loads forty or fifty times the weight of their own bodies, which is a degree

of strength far beyond that of the horse. Linnæus says that if the elephant had been endowed with the strength of the beetle, in proportion to its size, it would have destroyed the largest vegetable structures, and hurled rocks equal in size to the giants of ancient mythology.

We now come to the study of vertebrated animals which comprehend all the larger species on the globe, including even man himself.

Here we have an entirely different arrangement, in the organs and tissues of the body. The muscles and other soft parts surround the solid framework, instead of being placed within and covered by a horny casement. The bones of the Vertebrata, are used by the muscles as levers in performing the functions of locomotion, mastication and respiration. The most important organs, as the brain and spinal marrow, alone are placed in a bony casement.

The Vertebrata have the largest extent of motion. Their organs are not subject to the various changes of the animals we have just noticed, but are all developed in regular and harmonious succession, without the metamorphoses of the insect, or the change in covering of the Crustacea. It is true the exfoliation of the cuticle bears some resemblance to the casting of the shells and coverings of different animals, but when closely examined they will be found to be essentially different.

The composition of bone varies essentially from that of shell. The former is composed almost entirely of phosphate of lime, the particles of which are united by a force of adhesion, together with a transverse fibrous arrangement; while the latter consists principally of the carbonate, arranged in thin scales, and united by an adhesive animal matter. Bones are deposited by a process of nutrition, in the interstices of a kind of cartilaginous mould;* while shell, as has already been remarked, is

* Although this substatance is generally called cartilage in our works on anatomy and physiology, yet its composition is essentially different. Cartilage is mostly formed of albumen, while the basis of bone conststs principally of gelatine.

formed by a kind of mechanical exudation from the mantle of the molluscous animal. As the formation of bone, however, is familiar to our readers, we will not pursue the subject any further at present.

Passing by the remarks of our author on fishes, and terrestrial vertebrata, we come to that portion of his work, which treats of the *Mammalia*, or those animals which possess a spinal column, breathe air by means of lungs, and are warm blooded and viviparous, conditions which render it necessary that they should have *mammary* organs, for the support of their young. Here he traces the different tribes of animals, with their various modes of existence, and the organization necessary to enable them to procure their appropriate food, and to prepare it for the purposes of nutrition. Every animal has all in its construction that is necessary to enable it to live in its appropriate sphere, and to procure its food according to its habits and instincts. Although there is more or less uniformity of plan, in the whole, still each tribe is furnished with its proper bones and muscles, all of which are more complicated as we approach man, in whose structure we contemplate capacities, widely different from all that is below him.

Leaving what he has said in relation to the mechanical functions of birds, we shall now notice his remarks on the vital functions of organized matter.

Could the body remain continually in a state of perfection, many of those functions which are strictly vital, would be unnecessary after its growth had been completed. This, however, is not the case. Every muscular contraction produces some vital, chemical, or mechanical change, in the various parts of the body. A certain amount of nervous fluid and muscular irritability is exhausted, and a process of vitality is necessary to restore the waste. Indeed constant change appears to be one of the conditions of organized existence. The particles of which the body is composed, are constantly passing off, either as secretions or excretions, and nutrition is necessary to supply their places. This requires an extensive apparatus, which like the mechanical functions, is constantly becoming

more complicated as we rise in the scale of life. The ancients supposed that a period of seven years was sufficient to work an entire revolution in the structure of the body, but it is probable that even bone itself does not retain any of its original particles, for even half that period. The process by which the system is enabled to support itself amidst this waste of materials, is termed *nutrition*, which embraces Assimilation, Circulation, Respiration, Secretion, Absorption and Excretion.

As Roget has added nothing to what was already known in relation to these functions in general, we shall not, follow him through all he has said on that subject. We shall, therefore, turn at once to his chapter on vegetable nutrition, a subject but little referred to in our works on physiology.

The older authors supposed that plants were able to live on water alone, but this doctrine has been overturned by late observations. Indeed we need not be surprised that the ancients maintained this opinion, for we have heard a distinguished teacher of medicine, of the present century, declare that plants had the power of forming carbon out of water, and molluscous animals, carbonate of lime out of nothing!

Most plants obtain their food from the soil in which they are placed. It is usually dissolved by the water which percolates through the earth, and then passes readily through the capillaries of the roots into the body of the plant, and from thence to the leaves, where it undergoes a change analagous, to that which takes place in the chyle and venous blood of the animal in its lungs.

The roots are the principal organs of absorption in vascular plants, while the *Algæ* perform the same function, by means of their external surface. The same is true, to a greater or less extent, with most of the *Fungi*. The roots of vascular plants terminate in small filaments, or *spongioles*, and it is here that absorption takes place. Some have supposed that the extremities of roots have the faculty of drawing the particles of nutritious matter from the soil, by means of a kind of suction, without being placed in actual contact with them, but this supposition is probably unfounded. The roots seem to

travel in every direction in quest of food, and it is only when they reach it, that it enters the open mouths of the extreme radicles. Roget thinks that this absorption is chiefly, if not altogether mechanical, but the spongioles are no doubt endowed with a peculiar vitality, which enables them to select their food from the media in which they are placed, and to contract upon it, in order to push it onward in the vascular or cellular tissue. This vitality is probably only a modification of the organic life of Bichat, which is common to both animals and vegetables — the spongioles, like the lacteal vessels resisting the entrance of foreign agents, and thus preserving the peculiar textures of the plant, though surrounded by a foreign soil. He observes that when the spongioles are placed in a glutinous fluid, of much density, their pores are soon filled and the circulation is arrested; or when poisonous matter, as the sulphate of copper, is presented to them, in a state of solution, it is received into the plant, and its life at once destroyed. Although it would seem, from these remarks, that death was invariably the result of the application of such agents, yet repeated experiments of our own, which will be varied during the coming season, and perhaps published, lead us to doubt the truth of this assertion. We are aware that the irritability of vegetable tissues, is a subject involved in much obscurity, yet it seems evident to us, that the vitality we have already referred to, does exist, and that a plant as well as an animal, is endowed with a kind of instinct, which enables it to perform its various functions, during the periods of its existence. If a plant peculiar to dry ground, be placed in a wet soil, it will invariably send its roots towards the high land, if any be in its vicinity. The reverse is the case, if a water plant be placed in dry loam, near a marsh or pool of water.

Sap, when received into the vessels of a vegetable, rises principally through the alburnum of ligneous plants, until it reaches the leaves, where it undergoes the important alterations already mentioned. In the early periods of the development of buds, the fluid, termed by vegetable physiologists, *nursling*

sap, ascends through the innermost circle of wood, or that which immediately surrounds the pith, until it reaches the young bud, which at once commences a growth, that is continued until the leaves are prepared to accomplish their important functions. What change this fluid undergoes, in its passage to the bud, is entirely unknown, but it probably combines with some agent previously existing in the channels through which it passes, and by a process of elaboration, is prepared to perform its part, in the early periods of vegetable nutrition.

The channels through which the sap finds its way from the roots to the leaves, have never been ascertained. De Candolle, one of the best writers on this subject, says that it passes through the intercellular spaces, but although he adduces many facts in favor of his position, the subject is by no means settled.

The power which accomplishes the circulation of vegetables, is also involved in much obscurity. It no doubt depends upon a kind of contractility, which has, as yet, escaped our notice. Hales ascertained that the fluids arose by a power equal to the pressure of between two and three atmospheres. The velocity of the sap varies, however, in different plants, or at different periods in the same plant.

As soon as the sap arrives at the leaves, a process of exhalation commences, which reduces the watery proportions, about two thirds. The quantity of fluids that thus escapes from the plant, is about seventeen times as great as that which passes off from an equal portion of animal matter. It is curious that heat does not exercise any thing like the influence over vegetable exhalation, which light does, and hence it is only during the day that this function is in the greatest activity.

The exhalation of plants takes place through the *stomata*, or pores in the leaf, consequently the structure of leaves controls to a great extent, the escape of fluids from their surfaces.

Besides the increase of density, which takes place in the sap, other important changes are accomplished in the leaf.—It is here that a change is produced in its relative constituents; the oxygen passing off, while the carbon is retained, a process opposite to that which is accomplished in the lungs of the animal. After the oxygen is disengaged, the carbon is left ready to be deposited wherever it is necessary.

It is in the green substance of the leaf alone that this peculiar change, which may well be termed the respiration of vegetables occurs. But the process does not stop here. As soon as the sun disappears a reversed action takes place. Oxygen is absorbed, and, uniting with the carbon which has arrived from the vessels of the plant, combines with it and forms carbonic acid. The mechanism by which this is carried on is not understood by the best physiologists. Whether it is accomplished by means of a contraction and relaxation of either the air cells or proper structure of the leaf, or whether it is the offspring of a peculiar absorption cannot readily be ascertained. We think that we have discovered cells of considerable magnitude, in the leaves of the Cucumis sativus, but their proper functions could not be determined. They are undoubtedly connected in some way or other with the function of respiration.

We must acknowledge that the necessity of the reversed action, which takes place day and night, in the leaves of plants, is not so apparent to us as it appears to be to our author. He says that "it is evident that the object of the whole process is to obtain carbon in the precise state of disintegration, to which it is reduced at the moment of its separation from carbonic acid by the action of solar light on the green substance of the leaves; for it is in this state alone that it is available in promoting the nourishment of the plant, and not in the crude condition in which it exists, when it is pumped up from the earth, along with the water which conveys it into the interior of the plant." Now it seems to us that it is only in the state of carbonic acid that the carbon is admitted into the roots of plants during the earliest periods of

absorption. We know of no means by which pure carbon can be dissolved in water free from any foreign impregnation. Sir H. Davy attempted to make the roots of plants absorb the most finely comminuted carbon, but failed entirely during a long series of experiments. We must still think, therefore, that the object of this absorption of oxygen at one period of the day and elimination of it at another, is involved in obscurity, and it yet remains for some student of nature to enlighten us on the subject. It is more than probable that plants do not obtain even the principal part of their carbon from the soil. They undoubtedly get large portions of it from the atmosphere, and it seems to us quite likely that it is for this purpose that the air, which always contains some carbonic acid, is taken into the structure of the leaf at night, and the oxygen thrown off again during the day. If this be true the atmosphere is daily receiving large accessions of oxygen from the vegetable kingdom, while it is as constantly obtaining carbonic acid from combustion and animal respiration. Thus the two grand kingdoms harmonize in their effects upon each other, even while life continues; the one removing from the atmosphere that which is injurious to the other, and thus preserving the proper balance upon which the welfare of both depends.

We now come to a most interesting part of vegetable nutrition—the return of the sap.

No additions are made to the tissues of the plant, during the ascent of the sap, for it must be elaborated in the leaf before it is fit for vegetable nutrition. The entire growth is accomplished after the fluid commences its return to the inferior parts of the vegetable. Our author supposes that a large proportion of the water of the sap, is actually decomposed, and that its separate elements, oxygen and hydrogen, are combined with certain portions of carbon, hydrogen, nitrogen and various earthy metals and salts, so as to form the proximate vegetable products which are found in the returning sap.

Gum is the simplest, and generally the most abundant of all the vegetable products. It is also invariably found in the

returning sap, and hence it is said to be the basis of vegetable nutriment. From the investigations of Prout, it appears that gum is composed of one atom of water, and one of carbon, or in other words, that 1000 grains of gum are composed of 586 grains of oxygen and hydrogen, in the exact proportion in which they would have united to form 586 grains of water, together with 414 of carbon, hence it would seem that this article may have been readily formed in the leaves.

The vessels through which the sap descends have given rise to some discussion among physiologists. Some maintain that it passes through a peculiar set of vessels, while others think that it finds its way through the same vessels in which it ascended to the leaves. Roget inclines to the latter opinion, but we think that, the former alone can be maintained. It seems to us absurd to contend that currents of different fluids, disposed to mix with each other, should pass in opposite directions through the same channels at the same time. Be this, however, as it may, a part of the sap descends through the liber, or innermost layer of bark, while another portion passes through the alburnum, or outermost layer of wood in exogenous plants. In its passage it deposits the materials for the future alburnum and liber, in the form of a glutinous substance, termed *cambium*, which is eventually condensed into the organization proper to the plant. The roots are elongated by the sap on its return to their extremities from the leaves, so that they increase in length after the buds are developed.

It is interesting to remark the little difference there appears to be, between the composition of pure gum, and the proximate principles of vegetables. We have already remarked that 1000 grains of Gum Arabic contains 586 of oxygen and hydrogen, united in the proportions in which they exist in water, and 414 of carbon. Now the principal vegetable products, fecula, sugar, and lignin consist of the following materials—dried starch of 560 parts of water and 440 of carbon, sugar of 572 of water and 428 of carbon, and lignin of 500 of carbon and 500 of water. Thus it would require but little

change in the elements of gum to produce any of the materials above enumerated.

But there are several saline compounds, and earthy, and metalic bases, which are carried into the structure of plants. The most important of these are silicum and potassium.

Besides the productions which are conveyed into the vegetable by means of the sap, or formed from it by a simple process, such as has already been mentioned, there are others which require a more complicated apparatus, as well as higher powers of vital action, to complete the necessary changes. Such are termed vegetable secretions. They are formed in the glandular tissue of plants. It is to these organs that vegetables principally owe their medicinal properties. We should like to follow our author through all he has said on this subject, did time permit. One of the most striking of the vegetable secretions, is the caustic liquor, which is collected in the vesicles, at the base of slender hairs on the stems and leaves of the common nettle.* This fluid has recently been ascertained to be alkaline, and the mechanical process by which it is thrown into the animal tissues, which come in contact with the minute spicula, has already been mentioned. The vesicles are entirely membranous, so that the least pressure on the hairs, or hollow spicula alluded to, will cause their contents to flow into whatever their extremities are introduced.

But plants not only perform a function of secretion, for they also throw off effete or foreign matter by excretion. This they do principally by their roots, for the sap on its passage downwards, is constantly being loaded by such particles as have become useless in the vegetable economy.

We come now to make some remarks on what our author has said, on animal nutrition, and here we must necessarily be very brief. We shall only notice his observations on nutrition, in the lower classes of animals, as he has added nothing to our former stock of knowledge on the same subject, in the more perfectly developed species, and we take it for granted,

* Urtica dioica.

that our readers are already acquainted with all the doctrines of the standard writers, on this interesting subject.

The food of animals differs essentially from that of vegetables, at least in those of complex organization. Animals do not draw their subsistence directly from the soil, but on the contrary, they can live alone on that which has previously been arranged by a vital chemistry. Indeed the principal, if not the only part which vegetables are destined to perform in animated nature, is the formation of materials which are to supply subsistence to a higher department of life. The principal chemical changes which take place in vegetable products, in their passage into animal structures, is the abstraction of carbon and the addition of nitrogen. But all animals do not subsist on vegetables, for whole tribes live on those which are either below or above them in the scale of life. Some live on insects, while others consume the carcases of larger animals. Indeed so great is the appetite for animal food, that when an ox is slain, all that is left of him by man will immediately be devoured by rapacious birds, quadrupeds and insects. "But," says our author, "if we follow the undecomposed particles of animal matter, which may have been swept down by the rains, and deposited in pools and lakes, amidst waters collected from the soil on every side, we here find them under favorable circumstances again partaking of animation, and invested with the various forms of infusory animalcules, which sport in countless myriads, their ephemeral existence, within the ample regions of every single drop." It seems, however, that they do not stop here, for they soon float along the rivers into the sea, where they contribute to maintain the innumerable hosts of animated beings, which people every portion of the ocean, and which rise in the regular gradation, we mentioned in the early part of this review, from the microscopic monad and scarcely visible medusa, through endless tribes of mollusca, and of fishes up to the huge leviathan of the deep. Some suppose that even the minute particles of animal matter, which are not sufficiently large to remain on the surface of the earth, rise into the

atmosphere, where they support an innumerable family of animalcules, giving rise to a great variety of diseases that are the means of reducing the human frame to atoms, which again take the never ending cycle of vicissitudes and transmutations.

In his next chapter, he notices the nutrition of the lowest orders of animals. Those which belong to the polypi, present us with the simplest form of the organs of nutrition. Here nothing is to be found but a kind of stomach, consisting of a simple sack or tube, for the reception and digestion of food. We cannot trace the rudiments of a brain, heart, lungs or vessels of any sort. The body seems to consist of a pulpy mass, hence it is probable that the only way in which the aliment enters the system after the food is digested, is by a kind of capillary imbibition.

The hydra, a species of polypus, though unable to move from the rock on which it is placed, devours all kinds of animal food that comes within its reach. A great number of tentacula, or small filiform processes, surround its head extending in every direction, for the purpose of arresting the food that may come within its reach, and conveying it into the mouth of the animal. Even small fish are thus caught and devoured with the greatest eagerness.

It has been ascertained, by Trembley, that a hydra may be completely turned inside out, like the finger of a glove, and still perform all its former functions, after the external skin has been converted into a digestive apparatus.

It is also proved that the same animal may be divided longitudinally into a great many different pieces, and still each survive the injury and become a separate head, having the various organs which belonged to the original. Different polypi may be engrafted upon a single body or a number of bodies may be united, by removing a portion of their external surfaces, and thus a compound monster may be produced, equally complicated with the boasted forms of ancient fable.

Although the infusoria cannot be seen by the naked eye, still they have their appropriate food, which is received into a

digestive apparatus, where it undergoes all the changes necessary for the nutrition of the animal.

The digestive organs in all the lowest animals, are extremely simple, mostly consisting of a number of sacks, without any anal terminations. Such is the case with the animals last named. Ehrenberg counted over two hundred stomachs in a microscopic monad, where the same organ seemed to perform the functions of digestion, nutrition, and circulation.

As we rise in the animal scale, however, this extreme simplicity is exchanged for complicated apparatus. We soon find a heart and vascular system, as well as a stomach and alimentary canal. The labor is divided among different organs, and consequently it is more perfectly performed.

We should like to follow our author through all his investigations in comparative anatomy, in relation to the organs of prehension and mastication of food, but as this review has already extended beyond the limits assigned to it, we must hasten to a close. Suffice it to say, that the teeth of animals always bear a direct relation to the food upon which they subsist. So well was the great Cuvier assured of this fact, that he did not hesitate to assign an animal its proper place, and to infer its various habits and instincts, from the examination of a single tooth.

In relation to the digestive apparatus it, too, is modified by the habits of animals, and the nature of their food. Those which live on vegetable diet, have alimentary canals, much longer and more complicated than those that subsist on a different kind of food.

The circulation of the lower classes of animals is a subject of much interest, in as much as it shows a general gradation of organs, always increasing in complexity, as we ascend the scale of life. In Zoophytes and the Infusoria, with other simple classes, the contents of the alimentary cavities pass into the system of different animals by means of a kind of mechanical imbibition. In the Medusa the circulation appears to be cellular, but in the Asteriæ, a grade but little above

the last named, the rudiments of a vascular structure, according to Tiedemann, is observable. Here, however, it communicates with an alimentary canal and respiratory organs, and of course, there can be no regular circulation of fluids.

Insects have a kind of mixed circulation; the fluids being first placed in the dorsal vessels, and then diffused in the cellular structure, they continue to move onwards, propelled by a contraction of the vessels and cells, until the circulation though simple is complete.

When we reach the Mollusca we find the vascular system changing from a mere dorsal vessel, to a smaller centre, with regular vessels proceeding from it. When we arrive at the Lobster or Crab it is changed into an oval or globular organ, with regular contractions sending its contents through a system of vessels to all parts of the body. This may be termed the heart of the animal, although its structure is much more simple than the same organ in the warm blooded animals.—As we advance still higher in the scale, this organ changes from a mere vessicle to a compound instrument having different cavities and vessels.

Our author seems to think that the blood in the mammalia passes directly from the capillaries of the arteries into the capillaries of the veins, but this view of the subject is rather behind the improvements of the day. The blood instead of passing directly from one set of vessels to the other is thrown into a kind of areolous tissue, where it moves in various directions until nutrition is accomplished. Indeed he seems in many instances, to adhere to the older doctrines in the minutiæ of the science.

In the higher classes of animals, and where the circulation is most perfect, a set of vessels carries the blood to the organs of respiration, while another returns it to the heart, to be distributed throughout the general system, but in the lowest, one set of vessels or cells, performs both the functions of respiration and nutrition. The blood instead of being presented to the air cells of the lungs, is distributed to the external

parts of the body where it meets with a sufficient quantity of air to effect the necessary changes.

In the Crustacea, the veins convey the blood to the vessels of the gills, where they enlarge into cells of considerable magnitude, in order to allow it to remain for sometime, in contact with the air of the water. After it has undergone the necessary change it is conveyed back to the dorsal vessels, already described, to be distributed over the remainder of the body.

In fishes the internal organs of circulation consist of four cavities, opening into each other, but the heart proper belongs entirely to the gills; the systemic circulation being carried on by means of an arterial trunk. The cavities are, first, a venous sack, or opening into an auricle; second, an auricle, third, a ventricle, and fourth, a dilitation of the branchial artery, termed *bulbus arteriosus*. In reptiles the heart consists alone of an auricle and a ventricle. The lesser circulation is only a part of the greater, hence the blood is always only partially changed.

We shall pass the observations of our author on the pulmonary circulation of the highest class of animals, without comment, and proceed to notice his remarks on respiration. This is divided into different modes according to the medium the animal inhabits, and hence it is either aquatic or atmospheric. The former is either cutaneous or branchial, and the latter tracheal or pulmonary.

Zoophytes have no organs of respiration. This function is probably performed either by the external parts of the body, or by the channels through which the currents of water, already mentioned, pass. The first trace of respiratory organs with which we meet, is in the most highly organized species of Annelida, as in the *Lumbricus marinus*, or lob-worm, where the respiratory apparatus consists of two rows of branchial tufts, projecting like the plume of a feather, from each side. In the Lumbricus terrestris, or common earth-worm, there is a single row of apertures, extending along the back which open into a respiratory vesicle, situated between the integument and intestine.

In fishes the respiratory organs are more complicated.—Here they consist, of gills or *branchia*, situated on each side of the throat, and so arranged that a kind of respiratory movement will always place them in contact with a supply of water, containing the necessary quantity of air.

Aquatic insects receive the water containing air into the cavities of the body, where it remains until the air is extracted, when it is thrown into a different part of the system, in order to prepare the way for a fresh supply.

In the mollusca which breathe air, as the snail, there is a round aperture near the head into which the atmosphere is received. This leads to a membranous sack overspread with a delicate network of vessels, which seems to be the first approach towards the pulmonary organs, termed lungs in vertebrated terrestrial animals. With the structure of these our readers are already acquainted, yet we cannot resist the temptation to lay before them the evolutions which take place in the respiratory apparatus of a frog, from the tadpole until the period of perfect development. No less than three sets of organs are provided for this animal at various periods of its existence. In the first place it breathes by gills, which project in an arborescent form from the sides of the neck, but as soon as another set is formed within the head these are removed. The tadpole now respires in the same way that fishes of the ordinary structure do, but when the body is sufficiently perfect to leave the water it is furnished with lungs ready to commence the process of an elevated respiration.

On the subject of secretion our author appears to be of the non-committal school, and cannot decide whether the glands act as a kind of chemical apparatus, forming the various secretions from the blood sent to them, by a different combination of its remote or proximate elements, or whether the same tissues act as strainers separating the products spontaneously formed from the circulating mass. He appears, however, inclined to the latter opinion.

In relation to the nervous power, he assumes the positions and maintains the doctrines advanced by Wilson Philip, in his work on the Vital Functions, a book which has been studied, we hope, by all of our readers.

He supports the doctrine, that the various systems of nerves are so constructed that each is affected alone by its appropriate stimulus. The eye alone can see, and the ear hear, hence those persons who pretend to hear with the stomach or to see through opaque bodies, or with their eyes closed, are nothing less than arrant impostors. It seems to us that they are about equal to the fabulous stories, of the metalic tractors, the sympathetic powder of Digby, or more recently, the fabulous tales, of some of our eastern periodicals, in relation to the wonderful effects of what they term animal magnetism.

Of tact or touch, he says that the lower animals, as insects, use it as a kind of language universal to the species. Bees execute their various works in the hive, as well as communicate to each other the passing events in which they are interested, by crossing their antenna, and striking against each other in different ways. The same is the case with ants.

To trace the olfactory, auditory, and visual senses, through the various grades of animal development, forms one of the most interesting subjects in Physiology. This we may do in a separate article in a future number but cannot undertake it at present.

None of the lowest tribes of Zoophytes, such as sponges, polypi, and medusæ, have the least trace of a nervous system. Still they can recognise the presence of their appropriate food when placed in contact with them. This, however, must be the result of an instinct which is placed beyond the narrow bounds of our comprehension.

The first trace of a nervous system in the lowest animals is found in some of the best developed species of entozoa, but it is not until we arrive at the crustacea that it appears to be distinctly perceptible, and even here it consists of a simple longitudinal cord, with a few transverse branches.

In the vertebrated animals, the nervous system is much better developed, and consists of a spinal marrow and brain, each of which becomes more complicated as we rise in the scale of life.

As all organized bodies eventually fall into entire decay, and their structures return to their original elements, a process of reproduction is necessary to preserve the various races of animals and plants from utter annihilation. This is performed in various ways. In some species there is a spontaneous division of the body of the parent, as may be seen in Monads and Verticella.

In plants, reproduction is mostly effected by seeds which contain *germs* or imperceptible organized atoms, which enlarge under favorable circumstances until the vegetable is perfected. This is termed, *Gemmiparous reproduction.*

We have already mentioned that the Sporifera including the Hydra, and other similar animals, propagated their species by means of buds or ova thrown off from the body of the parent.

The multiplication of the Infusoria has given rise to much discussion among physiologists—some follow the views of Buffon, who regarded them as the product of an inherent power belonging to a certain class of material particles, while others contend that no organized being can spring into existence without being derived from a similar parent. The latter opinion is no doubt correct, hence we must view the infusoria as the offspring of an animal resembling themselves, in forms, instincts, and habits.

The higher classes of animals are either oviparous, or viviparous, or both, as the viper, but as the habits of these animals, in their modes of reproduction are familiar to our readers, we shall not pursue the subject any further.

In the lengthened notice we have taken of the work of our author, we have attempted to lay his views on the physiology of the lower animals, before our readers, in as condensed a form as possible, and hence we have not quoted his language, but used our own, however much our readers may thus lose

in regard to elegance. The truth is the work is frequently verbose, though the elegancy of the style is sufficient to compensate for the time that may be spent in its perusal. Wherever we have differed from him in opinion, we have given our views in such manner that the reader will at once distinguish them from those of our author.

We do not wish to criticise the Bridgewater Treatises, yet it seems to us that so far as they have fallen under our notice they do not equal the expectations of the public as fully as was anticipated. The work we have noticed is among the best, but is it not probable that one equally elegent in language, and more profound and original in matter, might have been produced had those who had the charge of the funds merely offered the money paid Roget, as a premium for the best production on the department stated ? In this instance the writer would have acted under a stimulus, which would have produced greater results than a mere contract for a certain sum. Notwithstanding the lore of an eastern hemisphere, we do not hesitate to say, that twenty treatises of equal, if not superior merit, to the one we have just noticed, would have been written under the circumstances we have named, by American writers. W. W.

Art. VI. Western Medical Schools.

A Report made to the Legislature of Kentucky on the Medical Department of Transylvania University, Feb. 15, 1836. By Charles Caldwell, M. D.

A Catalogue and Circular of the Officers, Professors and Students of the Willoughby University of Lake Erie, 1836.

Introductory Lecture on the importance of the information derived from Medical Science, in improving the condition of a Country, &c. By Ed. H. Barton, M. D. Professor of

the Institutes and Practice, and of Clinical Medicine, in the Medical College of Louisiana, &c., &c., New Orleans, Dec. 1835.

An introductory Lecture, in which is considered the political importance of Medical Schools. By W. Byrd Powell, M. D., professor of Chemistry and Pharmacy, in the Medical College of Louisiana, &c. New Orleans, 1835.

In the pamphlets, the titles of which we have just enumerated, we find much that should gratify the profession in the West. The first affords evidence, that the oldest institution of the Great Valley, maintains herself on the elevation to which she rose, with a rapidity, almost unequalled, while the latter indicates a tendency in the public mind, to establish institutions for medical education, in regions where they are needed, and where but a few years since, such enterprizes would have been thought altogether chimerical,—we refer to the shores of Lake Erie and the Gulf of Mexico. We view these efforts with the greatest approbation, inasmuch, as they evince, in the profession and society at large, great activity of feeling, and must, by reciprocally stimulating each other to intense effort, produce results the most beneficial to science and humanity.

The character and genius of free governments, confide to the great principle of unrestrained and encouraged emulation, the whole subject of elementary and professional education. The most important business of the world, after the cultivation of the soil, is the cultivation of the mind and heart—the most useful class in society, are the agriculturalists, the most influential, the teachers. As the number of the former increase, the price of sustenance is diminished, consumption advanced, and human enjoyment promoted; as the latter multiply, the price of tuition diminishes, the professors make intenser exertions, learning becomes more fashionable, ignorance more contemptible, and the number of the educated in all the departments of society, proportionably greater.

In the sparsely settled portions of our new country, where school houses are few in number, many children grow up in ignorance, who would be educated, if they were reared within sight of one of these sylvan temples of primary learning. In like manner, when students of medicine are near to medical schools, they avail themselves of advantages, which but few of them seek, at the expense of a journey of several hundred miles. Before the UNIVERSITY OF PENNSYLVANIA was organized, but a small number of our physicians received a collegiate medical education, because to that end, a voyage across the Atlantic was required; and previous to the establishment of TRANSYLVANIA UNIVERSITY, thirty years afterwards, an inconsiderable part only, of those who commenced the practice of medicine in the West, graduated.

There was a time, when superficial thinkers regarded the former of these seminaries, as sufficient for the nation! But although it grew, with a sound and regular growth, to a magnitude which made it an honor to the new world, other institutions, in part from the power of its example, came into existence; and from Maine to Carolina, the sea board was dignified with medical schools, in which hundreds were annually taught, who would not have visited our *alma mater*. In like manner, while Transylvania has been advancing to an elevation, that has conferred distinction on the West, other establishments have started into existence, and she now finds herself in the centre of a system—the most brilliant luminary of a new constellation.

Passing by for the present, those members of this group, which are found in *this* portion of the western firmanent, we may refer to the new stars that are rising, as it were from the waters of the Gulf and the Lakes, and hail them as auspicious to the public good. The diseases which prevail in the basins of the great Mediterranean seas, relatively high up in the north, have their peculiarities, and the physicians who are to treat them, should, if possible, be instructed by teachers, who have experience of what they are to inculcate. The population of the shores of the Lakes, is increasing with a rapidity almost

unequalled, and in a few years will require as many physicians as could be educated in a single school. Western New York, North Western Pennsylvania, Northern Ohio, Indiana and Illinois, the whole of Michigan and Wisconsin, and the South West of Canada, ought at this time, indeed to furnish an adequate number of medical students, to support a respectable school on the Lake shore, and such an one, we doubt not, will be speedily established. Whether that commenced at Willoughby two or three years since, the circular of which is now before us, will become such a school, we are not called upon to predict, but we know no reason why it should not. It has five professors, the text books which they recommend are, on the main, well chosen; the catalogue before us presents the name and residences of 23 pupils, and a list of 5 graduates for the session of 1835–6, and the president and secretary of the Board of Trustees, with whom, only, of all concerned, we have the pleasure of an acquaintance, are gentlemen of respectability and enterprize; *prima facia*, we see no obstacle to the success of the undertaking, and as far as the humble influence of this Journal can, it will be found to promote that object.

The Medical College of Louisiana, in New Orleans, was chartered in the winter of 1834–5. Its class was of course small, but the session which is just over, was attended, as we learn, by 22. This number, as well as that in the Willoughby school just quoted, may seem small, but let it be remembered that the schools of Philadelphia and Lexington, opened in a manner equally humble. We cannot conceive why a respectable Medical College should not be established in N. Orleans. But a few years since, the project of instituting a medical school in Charleston, was regarded as chimerical—now she has two, both of which, we believe, are in a flourishing condition.

The number of physicians required in the maritime parts of Louisiana, Mississippi and Alabama, to say nothing of West Florida and Texas, the latter of which must be supplied from the United States, is great, and physicians educated in the

Delta of the Mississippi, would, *cæteris paribus*, be much superior to those instructed by teachers inexperienced in the diseases peculiar to that region. The great commercial emporium of several millions of people — New Orleans — must forever afford an amount of clinical practice, and a supply of dissecting room subjects, unequalled perhaps by any other city in the union. It is true, that from the mildness of the winter, the latter cannot be long preserved; but this evil will be effectually counteracted by their number.

On this subject prof. Powell holds the following language, which we quote as a specimen of his style and thinking, and a correct statement of the argument in favor of adapting schools, to all the great localities of a country.

"Each district of country, from a difference of latitude, topography and other local contingencies, is, sometimes, visited by diseases peculiar to it, and always by particular forms or types of those which are common to many or all.

"For these peculiarities to be understood, they must be observed in the very spot where they occur. Consequently, the student should have advantages of instruction from those who are in the constant habit of observing them, reflecting on their causes and character and administering to the relief of those who are afflicted with them. In illustration of this doctrine, every one will admit the palpable absurdity of sending a student from Egypt to London to acquire a knowledge of the plague—or from Boston to this city to study the flattering and discouraging mutations of consumption—or from this city to Boston to learn the nature and treatment of Yellow Fever, or from our Charity Hospital to our interior Medical Schools to study clinical Medicine and Surgery; there being in those places, comparatively, very few opportunities for either.

"The principles of medicine being, universally the same, it may be contended that he, who understands them, is qualified to practice in any place; but it must be recollected that we do not, with the acquisition of principles, obtain a knowledge of all their special applications. Add to this fact, the difficulties which contingent circumstances produce, by acting upon the innumerable susceptibilities of our nature, and it becomes evident that the application of medical principles to the treatment of the diseases of any given district, requires a special study.

"Now the question is, shall this *necessary study* be made during the period of ordinary pupilage, and under the direction of competent teachers, or after the commencement of professional practice, and that too, under the responsible considerations imposed upon the practitioner by the danger of injuring his professional reputation, through

unsuccessful practice, with the consequent loss of many valuable members of society."

The professor goes into a comprehensive survey of the advantages to society, of the cultivation of Medical knowledge, especially of Chemistry, which it is his own proper business to teach, but the plan of this article does not permit us to follow him.

The object of professor Barton, is to show the importance of cultivating medical science, with a view to its application to public hygeine; and of consequence the value to the people of Louisiana, of cherishing a medical school. In reference to the latter, we make the following excerpt:

"With a peculiar climate and physical condition—with diseases and wants incident to this peculiarity—with a happy location which nature has pronounced past all rivalry—the commercial mart of an illimitable region, which the perfection of navigation, the wonders of steam, the facilities of rail roads in surmounting the obstacles of distance, all supply branches of that great circulatory system, whose heart is *here*, we find ourselves in a position, where it is indispensable we should rely upon ourselves. Here we are called upon, apart from our love of independence, to rely upon our own resources; resources, too, growing out of our peculiar wants, and which can be known only to ourselves.

"To become acquainted with this condition, to alter it where productive of disease, to point out those which are peculiarly producive to health and prolongation of life—to adapt man in living, clothing, exposure and circumstances, to the position in which Providence has placed him—is the peculiar province of our profession."

The necessity of science, enterprise and industry, to the preservation of the health of communities, is set forth by the professor, in the following remarks:

"It should be as gratifying to the pride, as it is flattering to the industry and intellect of man, that through their constant efforts only, the salubrity of any spot (not salubrious from position) is maintained; when these are relaxed, or when prosperity and civilization decline, the seeds of disease, are, as it were, immediately deposited in the earth. There is scarcely a nation of any note mentioned in history, whose progress and decline are not illustrative of this truth. In the flourishing condition of empires, disease has been kept at bay—industry and cultivation have kept pace with population—the arts and sciences have flourished, and man has fulfilled the great end of his being. With the decay of the arts and the innervation of a people, cultivation has been abandoned—negligence has supplied the place of

industry, and the mouldering columns and dilapidated palaces are the sure fore-runners of the pestilence that sweeps its desolating besom over the land, and finishes that which man has commenced. The sombre aspect of the Ottoman empire and the flourishing condition of Great Britain, furnish impressive pictures of the truth of these remarks, the former being in the most neglected and sickly state, the latter the best cultivated and most healthy country of Europe. It is thus that fate itself, fore-domed by negligence and ignorance of invariable physical and moral laws, advances to destroy the cherished pride of many ages. Rome, once the queen of cities, is following the fate of Babylon, and from the same cause is daily diminishing in population. Pestilence advances from street to street, and has already become the sole tenant of some of its finest palaces, temples and churches. Rome, indeed, might be singled out, as affording in itself, and as a warning to us, a history of most that is interesting in the police of health. When still the capital of the world, in spite of pestilence, she overflowed with population, and the disadvantages of her position were counteracted by the activity and moral excitement of her inhabitants, the drainage of marshes, the width and durability of her paved streets, and the abundant supply of pure water, from her numerous aqueducts, for baths and other domestic purposes."

The author proceeds to make an application of his principles to the Delta of the Mississippi, and especially, to the site of New Orleans:

"And what does not our own country owe to the advantages of draining, clearing and the influences of agriculture? By it spots that were untenantable or fatal to the early settlers, afford healthful homes to thousands—the primeval forest has given way before the axe of the husbandman—the sickness of the early settlements, with their half cleared and half cultivated fields, have disappeared before a thorough and perfect reclamation and cultivation. The same effects would follow with many additional benefits, the clearing of our own swamps, by removing the sources of moisture and evaporation—our heavy dangerous dews, and those obstructions to ventilation, without which there can be no health any where; general salubrity would diffuse its blessings upon us, population would increase, and all the comforts and enjoyments of a highly advanced and progressive condition, would be poured upon us. Cast your eyes for a moment, upon what you have already done; the very ground on which you now tread, was but a few years since a great unsightly morass—the home of the alligator, the retreat of the bear and tiger, where the contest was, whether the watery element or the evergreen cypress with its funereal foliage, should hold dominion over the country. Now view the contrast! a city springing as by enchantment from the subdued marsh, with scarcely a rival in the magnificence of its buildings—the extent of its improvements and resources—the lofty enterprise and intelligent foresight of its inhabitants, stretching her arms of conquest—of cultivation—of commerce, over regions on which the sun never sets, and I wish I could add, as I hope soon to do—equally remarkable for the

extent and usefulness of her literary endowments. But yesterday, it was in the cradle of its existence—the outline of its future is lost in a splendor unsurpassed, which the racked eye and bewildered fancy in vain exerts itself to realize or circumscribe. But mark, the splendid outline of this prophetic future, is only to be filled up through industry—through toil—by the fulfillment of the moral as well as physical laws. Indolence then is forbidden by the decrees of Providence, and this is legibly written in the character of your country. Your reward shall be commensurate with your exertions—*nil sine magon vita labore dedit mortalibus*, noble is the incentive, rich the return, and without it, disease, degradation, poverty, slavery."

Leaving the new school of the South to the fostering care of that industry which is here so earnestly recommended, and which cannot fail to raise it into respectability and usefulness, we turn to our western *alma mater*, and find ourselves forcibly carried back to the days of her first *lactation*. The Medical Department of Transylvania University, was organized in the autumn of 1817. Its first Faculty consisted of five professors, Dudley, Blythe, Richardson, Overton and Drake. Its class numbered 20, and at the end of the session, just 18 years ago, the degree of Doctor of Medicine was conferred on one candidate, Mr. McCullough, a native of Lexington. This was the first Medical Commencement ever held west of the mountains. During the present spring, the same degree has been extended by five different institutions, to 130, and the number of students in attendance was 500—facts which speak well for the advancement of medical science in the Western wilderness.

The medical lectures in Transylvania, were suspended in the year 1818, and resumed in 1819 ;—the reorganized faculty being composed of Drs. Dudley, Richardson, Blythe, Brown and Caldwell—the number of pupils, 38. From this time, its development was most rapid, to the autumn of 1825, when it numbered 281, since which, it has fluctuated between 152 and 262. For the last three years, it has varied but two from 260. The aggregate number of students from its foundation, has been 3350, one half of which, we may fairly presume, would have gone into practice without a University education, if this school had not been established. In 1823, Dr. Drake was reappointed into this institution ; in 1825 Dr.

Short, in 1827 Dr. Cooke, and 1830 or 1831, Dr. Yandell. The Faculty now consists of Drs. Dudley, Caldwell, Richardson, Short, Cooke, Yandell and assistant professor Peter. It is worthy of remark, as it is creditable to those who have, at various times, constituted the Medical Faculty of Transylvania, that its distinguished success has been independent of any other extraneous aid, than $5000, from the State of Kentucky, and an equal sum from the citizens of Lexington.

The object of Professor Caldwell's report or rather address, to the Legislature of that State, was to obtain an appropriation of $10,000 for the purchase of additional *materiel* for instruction. His application was supported by a compact and powerful argument, which we think ought to have been irresistable; but that honorable body we believe, thought otherwise, and contented itself with giving to the learned and zealous professor, a respectful audience. We shall extract from it, as sustaining our views on the necessity and propriety of various schools in various localities, the following proposition which the professor informs us he presented to the General Assembly of Kentucky, 15 years before, with his late commentary upon it.

"*The School being established in the great Western Valley, will throw much new and important light on the diseases of that Valley, which must lead to a more rational and successful treatment of them.*

"This view, which was but *prophesy* when presented, and which few received with entire credit or favor, is *history now*. In evidence of its correctness, the pupils of Transylvania, are, as a very general rule, the ablest and most successful practitioners of their age, both in medicine and surgery, in the Mississippi Valley. However unacceptable and perhaps displeasing to some this assertion may prove, experience and observation testify to its truth. Though I make it therefore fearlessly; yet, in doing so, I mean neither offence, condemnation, nor disparagement toward any physician, or any school. My object is to state what I know to be true. The statement, moreover, is but a *tribute of justice* to the sons of Transylvania, for their devotedness to their profession, the high standing they maintain in it, the benefits they confer on their fellow men in the practice of it, and the credit they reflect on their Alma Mater. *And I glory in awarding it.* Having first by persevering industry as pupils, rendered themselves competent to their professional duties, they are now faithfully performing them as practitioners. A knowledge of this induces their fellow citizens to confide in them and employ them. Hence the ascendency they so usually attain. Another leading cause of this result is plain. The

professors of Transylvania being familiar with the nature and treatment of western complaints, can best communicate a knowledge of them to their pupils. For this reason alone, the School is worthy of every form and degree of patronage the public can bestow.

"Apart moreover from all other considerations, the period has arrived, and seems to be mature, when the western people should patronize and encourage western institutions alone. In no other way can such institutions be brought to the perfection they are destined to attain. Nor can they become otherwise productive of the full amount of usefulness, for which they are intended, and to which they can be made competent. To say nothing then of western pride, which should prompt the desire to become less dependent on eastern resources, the measure is called for by the INTEREST OF THE WEST. The Valley of the Mississippi is believed to contain between four and five millions of inhabitants, and is increasing in wealth, population, and power, with a rapidity undreampt of in any other section of the Union. It is but manly in it then to throw off its minority, proclaim its literary and scientific independence, and set up for itself. And I confidently trust that the day is near at hand, when the proclamation will be issued, and carried into effect. The enterprise is easy; and, I repeat it, that the GREAT WESTERN COMMUNITY owes it alike to its INTEREST AND ITS HONOR. Within less than half a century, the preponderance of power in the Union will be in the Mississippi Valley. Nature herself, by the unrivalled magnificence of her western works, proclaims the "coming event," which already begins to "throw its shadow before." Let the people of the valley then, by providing for every form of mental cultivation, prepare themselves for the wise and virtuous exercise of this power, when in time it shall become theirs! In this way alone can they discharge their duty to themselves and their country, their contemporaries and posterity!

Cherishing as we do a sentiment of respect for Transylvania, the pioneer institution of the West, we concur in almost every thing which the learned professor has advanced in her favor; but successful as her efforts in the cause of medical education have been, we do not look upon the organization and labors of her Medical Department, as faultless, nor is it precisely according to the fact, to affirm, as professor Caldwell, does (p. 32,) that the "*institution has acquitted itself to* ENTIRE *satisfaction for sixteen years, and done more, much more, on five thousand dollars, than any other similar school in the union, has done on seven-fold the sum.*" The Jefferson Medical College at Philadelphia, established under the walls of the University of Pennsylvania, when it had more than 400 pupils, without, as we believe, having received a dollar from the state, attained, during the past session to 370 pupils, an equal or greater number

than the University, and nearly 100 more than Transylvania. The number of her graduates, the present year, was 14 or 15 greater than that of her elder sister, making her, indeed, the first school in the continent, although she came into existence, under circumstances the most adverse, six years after the present organization of the Transylvania Faculty. We make this statement in no spirit of detraction, but of justice; and to evince, that although western in our feelings, we are not insensible to that which is meritorious in the east.

In conclusion, we feel it a duty, to say something on the policy which should govern our schools. Increase in their number, will generate competition for pupils, which may either lead to an elevation or a depression of the standard of excellence. When rival institutions seek to surpass each other, in the value of their instruction, and to acquire superiority of numbers by deserving it, the rivalship is a public blessing; but if, on the other hand, they relax in their requisitions, and place their honors on a lower level, they soon become a curse to the community. Unquestionably, it is *lawful* — we use the word without a reference to statutory enactments—for any association of physicians to get up a medical school, but it is *not* lawful — that is, not compatible with the welfare of society, nor the dignity of the profession — for them to seek patronage by a system of underbidding, or, what is still worse, easy examinations. When a new school is started, it should recommend itself by some improvement on existing systems, so as to hold out, with justice, the promise of making better physicians, than the old; while they should protect themselves against increased competition, by rising in the requisites to graduation, as often as an additional competitor enters the list — thus maintaining their relative superiority of numbers, by actual and increasing superiority of instruction. When all parties act on these principles, they operate under a sentiment of emulation; and every new college becomes a new stimulus to those already in existence, while they in turn react on it, and destroy all hope of success, except it puts forth upon the object, extraordinary powers. In such a contest, weak men can do

nothing, and this is the test of the truth of what we advance; for any system which banishes, the infirm of intellect, purpose, or perseverance, from our halls of learning, is good.—How far this principle has governed the organization and exercises of the medical schools of the West, and, indeed, of the Union, we shall not undertake to inquire; but it would be as rash, to affirm, that the best talent of the American profession is to be found in our seminaries, as that their organization does not imperiously call for revision.

Art. VI. Journal of Pharmacy.

The American Journal of Pharmacy, published by authority of the Philadelphia College of Pharmacy. Edited by R. E. Griffith, M. D.

We have before us the third number of the seventh volume, for Oct. 1835, of this useful work. For not having mentioned it before, we owe an apology, both to our readers and to the College, under whose auspices it is published. Its contents are original and selected; the former predominating, and consisting in a great degree, of papers from the current periodicals of Europe and America. Nevertheless they are interesting, because it is useful to have them collected and arranged in connexion with each other. On this account alone, the Journal deserves a far greater patronage, than it has received in the West, where indeed it is almost unknown. The value of this work is, however, increased by the communications which make up its original department, the most important of which, in the number before us, are from the pen of its talented Editor. We do not find in these papers, however, any thing specially deserving of analysis.

Of the selections, the first is a paper from the American Journal *of the Medical Sciences*, (which not having mentioned at the time of its publication, we shall notice here,) by Dr. Mettauer, of Virginia. It is on the use in Epilepsy, of the *Crusta Genu Equinæ*, hangers, or knee scab of the horse.

"The substance designated by the several appellations at the head of this article, is furnished by the horse; four oval surfaces, situated on the inner aspects of the extremities, near the knees, are the parts of the animal from which it is obtained. The secretion is poured out so gradually, and in such small quantities at a time, as not to be observed in its fluid, or even semi-fluid states. The crust is of variable color, as well as density; its exterior is always of a lighter appearance, and harder than the interior, which is dark and soft; it is of a lamellated and fibrous texture, and when broken, resembles dark, soft horn; its odor is very penetrating, diffusible, and peculiar; it is deciduous, and separates gradually two or three times during the year; when prematurely or forcibly removed, the surface from which it is taken, sometimes bleeds a little, inflames, and becomes tender and sore.

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"In collecting the crust for medical purposes, it is necessary to attend carefully to its loosening tendency from time to time, or it may fall off and be lost. It may be made to separate a little sooner by gentle solicitation, and occasionally by firm compression with a bandage.—This should be suffered to remain on after the period of disquamation is near at hand, to prevent the accidental loss of the crust. After it is obtained, it should always be dried a short time in the shade, and then it may be kept for use in a close jar, to prevent, so far as possible, the escape of its volatile properties.

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"Two forms for administration are only used—the powder and tincture. When the powder is to be used, it should always be freshly prepared, either by pounding and rubbing the dry crust in a mortar, or by grating it with a common nut-meg grater: this last process will be found, (generally,) most convenient, as it enables the practitioner to reduce it, at once, to a very fine and equable powder, even if the crust is imperfectly dried.

"The tincture is prepared by simply digesting the broken or powdered crust in diluted alcohol, or common brandy, exposed to a gentle heat for eight or ten days in the proportion of one part of the former to four of the latter.

"The doses of the powder vary from two to twenty grains; it may be given diffused in any liquid which the patient fancies. With young patients it is safest to begin with the minimum, and increase very gradually to the maximum doses. Should the disease yield before the largest doses are reached, no further augmentation need be made. When the tincture is employed, from ʒss. to ʒiss. are its extreme doses. Diluted with water and sugar, it may be given with very little difficulty to the youngest subjects, as it is tasteless, and in a great measure inodorous. In this form also, the doses should be very gradually increased, to prevent, as far as possible, the danger of exciting the system too much, which might result from the menstruum, should the doses be suddenly augmented."

As the title of this paper implies the *Crusta*, is to be employed in Epilepsy. It should always be preceeded by mild

purgation, and sometimes by blood letting. When the temperament of the patient is sanguine, the medicine should be given in substance.

"With young subjects from six to eight years of age, two grains will, in a majority of cases, constitute the commencing dose. We have never used it with patients younger than six years, or older than thirty. Older patients, say from eight to twelve, or fifteen years of age, will bear four or five grains, or even larger doses in the commencement, and with such it may be more suddenly increased to the maximum doses, without gastric disturbances. The remedy rarely offends the stomach when the foregoing precautions are properly attended to; on the contrary, it seems rather to compose and tranquilize this organ. Three doses, in a majority of cases, are as many as will be required in the twenty-four hours. Should cases occur marked by convulsions of unusual violence, with frequent paroxysms, it may be given oftener. From many trials with this article, it has not been perceived that there is much diversity of effect when employed in large or medium doses with young subjects."

The tincture is to be preferred in those who are but little inclined to a phlogistic diathesis, and from half a drachm to an ounce, and a half may be given three or four times a day.

"In obstinate cases the crust should be continued for more than a year before it is to be discarded, or the case abandoned as incurable; both forms should always be employed and used alternately.

"The crust in form of tincture is also a valuable nervine and antispasmodic in hysteric convulsions, and indeed in hysteria generally. In that variety, connected with or proceeding from uterine irregularities incident to sterile married (or unmarried,) females, it will be particularly serviceable; with such the paroxysms most strikingly resemble epilepsy."

The object of this paper being chiefly to commend to the notice of our readers, the Journal of Pharmacy, we shall content ourselves with placing before them a single additional extract.

"Mr. C. Texier, who is at present exploring Asia Minor, has transmitted from Constantinople to the Academy of Sciences of Paris, the following details respecting the cultivation of the poppy and the preparation of opium.

The seeds are sold at Kara-Hissar by measure of 60 ocques at 20 paras, the ocque, that is 30 piastres, (or about a dollar and a half.) The ocque of Constantinople is equal to about 2¾ pounds. They begin to work the earth in December by means of a hoe, or sometimes with a plough. The furrows are sufficiently large to permit persons

to pass without damaging the stems of the poppies, which are planted in beds of three feet and a half wide. The seeds are sown broad cast but very thin. One ocque is sufficient to sow 1600 square metres. A few days after the flowers have fallen, the heads are slit horizontally, taking care that the cut does not penetrate to the interior. A white milky juice exudes, which is left for twenty-four hours, and then scraped off with large, dull knives. Each head furnishes but a few grains of opium. The drug is sophisticated by portions of the epidermis being mixed with it, thus increasing the weight about a twelfth. The opium is now in the form of a sticky granular jelly. It is placed in small earthen vessels and pounded, the operator spitting in it from time to time. When the peasants are asked why they do not use water instead of saliva, they reply that water would injure it, the opium is then wrapped in dry leaves, and is fit for sale. The seed is not injured by cutting the heads.

"The quality and abundance of the crop are favored by the absence of heavy rains during May and June, a few days rain being sufficient to cause a great loss.

"On the above being read, M. Guibourt stated that in his opinion this mode of collecting and preparing opium, was peculiar to the spots visited by M. Texier, but that it is not probable that the opium of commerce is thus manufactured; as it is not noticed by other travelers, and also that an inspection of good opiums of commerce, show that they have not undergone such manipulations.

"M. Guibourt has already proved (*Dict. de Med. et de Chirur. prat.* art. Opium,) that it is erroneous to suppose that we do not possess the true opium of the ancients, or the product of an incision of poppy heads; and to say that we have only the *meconium* or the product of the expression or decoction of the plant. M. Guibourt is satisfied that the Smyrna and even good Constantinople opium, (grown in part of Natolia) are the product of incisions of the poppy head, and adduces in proof, that by carefully tearing these opiums and observing the fracture with a magnifying glass, they appear to be formed of small tears or drops, agglutinated together. It is evident that they have undergone no other preparation than that of being formed into cakes, and when sufficiently dried, each enveloped in a leaf of the plant, and in the Smyrna opium also with seeds of a *Rumex*, which however does prevent the cakes, in many instances, sticking together and becoming united.

"This Smyrna opium exactly agrees with the description of Belon: 'The best of opium, says he, is very bitter, hot to the taste so as to burn the mouth. It is of a yellow color, approaching that of the skin of a lion, the masses are composed of a number of small grains of different shades of color. For in collecting the said opium, the grains obtained from the different poppy heads are united together."

Oliver does not speak of any other preparation of opium, and the concurrence of these two travelers, joined to the physical characters of the smyrna opium, does not furnish a doubt of the mode in which it is manufactured.

But another method of preparing it does exist; this is mentioned by Dioscorides and Kœmpfer. According to the former, the juice collected from the capsules, for two successive days, is mixed together in a mortar; according to the latter, 'it is moistened with a *little wa-*

ter, so as to soften it, when it is well worked in a wooded bowl, with a wooden spatula, till it acquires the consistence, color and tenacity of malaxated pitch. When it has been thus worked, it is several times stretched out and rolled with the hands, and then made into cylinders.'

The opium prepared by either of these processes will not present the drops or tears so distinct in the Natolia, but will resemble the uniform texture of the Egyptian and Persian. M. Guibourt has specimens of the Persian opium given to him by Mr. Morrison, of London, which has all the characters spoken of by Kœmpfer. It is in cylindrical pieces, which have sometimes become square from their pressure on each other; they are about four inches and a half long, and about five or six lines thick, wrapped in satin paper and tied with a cotton thread. Each stick weighs about 20 grammes; internally they are uniform, reddish, presenting some appearance of agglutinated tears, when viewed with a magnifying glass, but of a smaller size than those of the Smyrna opium. It has a virous smell, mingled with mustiness, which also characterizes the Egyptian variety, prepared in the same manner.—*Jour. de Pharm.*

ANALECTIC, ANALYTICAL, AND ORIGINAL.

I.—ANALECTIC.

Ad Sylvas Nuncius.

1. *Treatment of Paralysis from disease of the Arterial System.* By WILLIAM STOKES, M. D.—With respect to the treatment of paralysis, if the patient be young, and the disease recognized at an early stage, it is possible that you may be able to arrest it by free local depletion, and other antiphlogistic means. In the case which was under treatment in the Meath Hospital, the symptoms had lasted for a considerable time before the disease exhibited any remarkable violence. The man was admitted on the 7th of February, and at this time the disease had been five weeks in existence, having begun at the lower part of the limb, and extended gradually upwards, until it envolved the whole leg and thigh. Yet it is very probable that this patient might have been saved, if proper means had been taken to arrest the inflammation of the vessels at an early period. Baron Dupuytren has published a case, in which it appeared that this disease was setting in, but was checked at once by bold antiphlogistic treatment directed to the affected limb.—*London Med. and Surg. Journ. Sept. 6th*, 1834.—*Amer. Jour. of the Med. Sciences, Nov.* 1835.

2. *On the employment of Blood-letting in Scarlet Fever.*—The *Edinburg Medical and Surgical Journal* for July last, contains an interesting communication from Mr. A. Dewar, of Dunfermline, on this subject. A dissection made of a child which had died of scarlet fever on the sixth day of the disease, and which exhibited unequivocal evidences of inflammation of the mucous membrane of the fauces, pharynx, trachea, bronchi, stomach, parts of small intestines, and brain, made early in life a strong impression upon Mr. D. and led

him to doubt whether the remedies usually employed were sufficient to conquer the inflammatory action, which, he regards as the cause of the morbid phenomena of the disease. The many mortifying failures which he experienced in his own practice and witnessed in that of others, led him many years ago to resort to general bleeding in the treatment of the disease.

"During the last twenty years," says Mr. D. "I have witnessed four epidemics of scarlet fever, and for two years past it has prevailed, and still continues to prevail, to a great extent in this town and neighborhood. Since the 1st of July, 1833, I have attended 183 persons laboring under this disease in its acute stage, *i. e.*, with the eruption *still present* upon the body, and out of that number it has been my good fortune to lose only *two*. Nor must this small degree of mortality be altogether ascribed to comparative mildness in the character of the disease. As a proof that the present epidemic has not been a slight one, I may mention, that, in this town and its vicinity, upwards of 150 persons have died of scarlatina within the last two years.

"The gratifying success now mentioned, with which the cases occurring in my practice have been attended, is to be attributed to the early and efficient employment of general blood-letting. In every case in which the remedy was properly used, I have invariably found the symptoms greatly mitigated, and in many the disease wholly and suddenly subdued. To accomplish this purpose, however, a scanty or long-deferred blood-letting will not suffice. It must be practised, as in other cases of acute inflammation, so as to produce a marked impression on the circulation, while the quantity drawn must be so considerable as to make it probable that the impression will be permanent. When, therefore, I had an opportunity of seeing the case from the commencement, I preferred drawing blood when the eruption had decidedly appeared upon the breast, but had not spread over the rest of the body. I selected this time chiefly to prevent all ambiguity respecting the nature of the disease. I likewise preferred the evening for the purpose, as I generally found, that, if the bleeding succeeded in breaking the force of the fever during the evening exacerbation, the disease was more certainly subdued than if the blood was drawn during the morning remission. On all occasions I have found it necessary to bleed, whatever was the age of the patient, to complete relaxation. The bleeding when thus practised is immediately followed by diminution of the heat of the body, of the force and frequency of the pulse, and of the head-ache and sore throat; and the eruption entirely disappears, and in many cases scarcely again becomes visible. While the blood yet flowed, many patients have expressed in strong terms the relief they enjoyed. I myself passed through the disease in November, 1833, and can speak from personal experience of the soothing influence which the remedy exerts over the feelings of the sick. None can know but those who have felt it, the sudden and delicious transition which I experienced on being bled, from burning heat, general restlessness, and confused thoughts, to perfect quietude and self-possession."

Mr. D. was for some time in the practice of setting the patient erect, and allowing the blood to flow until paleness, faintness or vomiting was produced. This he has more recently found not to be

sufficient. The mere relaxation, especially, if it has been produced by the loss of a small quantity of blood, seems to produce only a very temporary interruption to the progress of the disease; from this state the patient soon rallies, and the fever resumes its force. Of late Mr. D. has bled all persons who had passed the period of mere infancy in the horizontal posture, and when he has obtained what he considers a proper quantity of blood, he raised them into the erect posture till relaxation took place. In this way he thinks he has avoided the necessity of repeating the bleeding.

Although the commencement of the eruption is without doubt, the time at which blood-letting can be practised with the greatest success, yet, while the pulse continues strong, and there is reason to believe that effusion has not taken place in the head, Mr. D. has not hesitated to bleed, and has never had reason to regret it, indeed he says he has succeeded on several occasions, where he is convinced no other remedy would have availed to save the life of the patient.

"Ulceration of the throat," observes Mr. D. "is one of the most severe and painful symptoms that accompany this disease. It is the consequence of the inflammatory action which prevails throughout the whole of the mucous membrane. Though it is probable the ulcerations are more frequent in the throat than in any other part of the mucous membrane, yet, they are, without doubt, often to be found in the bronchial membrane and intestinal canal; and I am convinced, that, if dissection were carefully performed, they would be found to prevail more generally and extensively than has hitherto been believed. No treatment can be more unsatisfactory than the leeches, the gargles, and the liniments, which are in common use for the cure of this untoward symptom. In truth, the treatment of the sore throat proceeds upon a defective knowledge of the pathology of the disease. The depletion is directed to the throat, as if it was the only part of the system laboring under inflammatory excitement, while in reality it is only one link in the chain of general inflammation in that particular structure. If this statement require confirmation, it is obtained in the fact, that, since I have employed general bleeding in the manner described, I have not had occasion in any of the 183 cases I have mentioned, with a single exception, to apply a leech for the cure of the sore throat, although I have seen several die of ulceration in the throat, who had been treated in the usual way. In every instance the pain in the throat was relieved by the bleeding, and readily and speedily yielded to the most ordinary means, and indeed, in a great majority of the cases, required no special treatment at all.

"I have invariably bled the patient until the eruption *disappeared*, and in a considerable proportion of the cases it did not return, and even when it did return, it was much less diffused and less fiery in appearance. The scholastic and imaginary terrors, lest the eruption be interfered with, I have long disregarded. I look upon the eruption as the evidence of the inflammatory state, and the fever as symptomatic of the inflammation; and I find that the eruption and the fever for a certain period advance or subside together. It is true that the fever often continues after the eruption has ceased, but in these cases it is prolonged by organic lesions produced by the inflammatory action in some internal structure. Out of the 183 cases, 147 were bled, and in all the eruption was essentially diminished, in

many finally removed; yet not in a solitary case did any unpleasant consequence follow. The recoveries were uniformly rapid.

"Some speculatist will probably say, that, as the morbid matter is prevented by the bleeding from 'coming out,' the person will not be protected from a recurrence of the disease. Time alone can decide on the validity of this objection. I can only say in answer to it, that I have now known many persons who were thus treated, exposed, again and again, to the contagion, without being affected by it.

"It is gratifying to add, that I have not had even the approximation to a dropsical symptom. I have seen during the last two years fifteen cases of dropsy after *scarlatina;* but they all occurred in persons who had either received no medical treatment, or in whom the treatment had been conducted on different principles from that which I have been recommending. In none of these 183 cases has there been the slightest tendency to dropsical effusion.

"The two cases which I saw *during the eruption*, and in the treatment of which I proved unsuccessful, were instances of congestive fever. The onset of the fever was severe, and the reaction imperfect. The eruption appeared, but was pale, and fluctuated; and the face, hands, and feet, continued cold throughout the disease. The one died on the 4th day, the other passed on to deep typhus, and ultimately sunk apparently from exhaustion.

"The discredit into which blood-letting has fallen in the treatment of scarlet fever, has probably arisen from the want of due attention to the circumstances in which it has been prescribed. It is a remedy of great efficacy for good or for evil. If used at random, and without a careful discrimination of the circumstances of every individual case, it will, assuredly, justify the reprobation which Dr. Currie has thrown upon it; and may prove 'a fatal practice.' If used early, and in insufficient quantity, it will only diminish the strength of the patient, without lessening the force of the fever; and if delayed too long, it will accelerate the effusion into the head, to which the disease is fast hastening. If, on the other hand, it is practised at the proper time, and in sufficient quantity, it will prove a means of cure, safe and successful, far beyond any other with which I am acquainted.

"It will be objected, I dare say, that depletion, more especially ample depletion, will be unsuitable to some epidemics. There are certain conditions of the atmosphere, or rather certain unknown causes, under the influence of which, scarlet fever, (and indeed any other fever,) may assume an unusually malignant character. By this I understand that these causes, whatever they are, so modify the contagion, or the health of the individual, that the early stage of the disease is of unusually short duration, and the worst, or typhoid stage, is speedily developed. This I am willing to admit; but I believe it to be equally true, that the essential character of scarlet fever, I mean the inflammatory state is still present, and can be most successfully combated by its only appropriate treatment,—blood-letting; although certainly, greater promptitude and discretion are necessary in its application. The typhoid state is not the disease, but its consequence, and can only be prevented by removing the previous excitement. The free but cautious and seasonable depletion,

which has robbed typhus itself of many of its terrors, would, I doubt not, be more successfully directed to the cure of malignant scarlatina, than all our other remedies put together."

Mr. D. has related several cases illustrative of the prompt benefit resulting from his method of treatment, two or three of which we subjoin.

"Miss G., aged thirteen, was seized on the evening of the 30th of March, 1834, with languor, pain in the back, and sore throat. During the night she was very hot, extremely restless, and the morning of the 31st in some degree incoherent. I saw her in the afternoon. Her face was flushed, her eyes red, she tossed in bed, was drowsy, and it required an effort to rouse her to consciousness. Her neck was stiff; her throat swelled, very red and painful; skin intensely hot; pulse 125, and strong; her neck, chest, and arms, were covered with the eruption of scarlatina, to the contagion of which she had been exposed. She was raised in bed, and bled to about a pound, when she became faint and the eruption entirely disappeared. She expressed great and instant relief from the bleeding. Two hours after she sat up in bed and took tea. About nine at night a pailful of milk-warm water was poured over her body, after which she slept well. Next morning her pulse was 90, the pain of the throat greatly relieved, and her general feelings very comfortable; the eruption scarcely perceptible. A tea-spoonful of Epsom salts acted gently on her bowels. At night the tepid effusion was repeated. Next day she was so well as to be occasionally out of bed. Took gruel and tea with toast for food. No other remedy was used. On the fifth day from the attack she was able to leave her apartment."

"In the autumn of 1833, I was requested to visit a young woman, aged fifteen, on the fifth day of her confinement to bed, and the third from the appearance of the eruption. She lay prostrate in bed, was drowsy, and could with difficulty be roused to even imperfect consciousness. After a few moments of comparative stillness, she tossed from side to side in bed, and moaned constantly. The restlessness and moaning, with scarcely any cessation, had continued during the preceding twenty-four hours. Her eyes were red, the vessels of the conjunctiva being minutely injected with blood. Her skin was intensely hot, and impressed the fingers with a very peculiar pungent sensation. The distinct eruption had disappeared, but there remained on various parts of the body, particularly the arms and legs, large patches about half the size of the hand, of a dark red colour, resembling that of venous blood. The tongue was red, and universally excoriated. She complained when the epigastrium was pressed upon. The arterial pulsation in every part of the body was forcible and frequent. The danger was most imminent. Without delay, but not without hesitation, I drew blood from the arm. When about ten ounces had flowed she became faint. This quantity I regarded as insufficient to break the force of the disease. I therefore took the pillows from beneath her head, and put my finger on the wound till she rallied, and then withdrew other ten ounces of blood. After the bleeding she slept, and seemed more placid. In five hours the strength of the pulse and heat of the skin had returned, when she was again bled to a pound. During the night she was quiet, perfectly coherent, and slept occasionally. In the morning she was so collected as to give

a distinct account of her sensations. She complained of pain, and a sense of knocking within the head; her sight was perfect, and the color of the eye was natural, but the expression wild. The heat of the surface was still very great; but the red patches had entirely disappeared. The pulse was strong and frequent; and the tongue raw. I again bled her to about twelve ounces, and gave her after a short interval, a small dose of Epsom salts in large dilution. From this time the fever did not return with any violence. The only other remedies were tepid washing for several nights, and small doses of sulphate of magnesia to regulate the bowels. She recovered rapidly.

"On the 20th of January, 1835, a boy, five years of age, was confined to bed with a hot skin, sore throat, great thirst, strong pulse, restlessness. He was covered with the eruption of scarlet fever. He was bled to faintness. In the evening I found him running about the room. He was washed at bed time, and took a small dose of castor oil. No other remedy was used. Next day he was in the parlor."—*Ibid.*

3. *On the employment of Sulphate of Copper as a remedy in Croup.*—The praises lavished on the use of sulphate of copper against croup by Dr. Hoffman of Darmstadt, in 1821, in Hufeland's Journal, and reiterated in 1826 in the Journal of Harless, determined Dr. Droste to subject it to trial; and this he has done for the space of seven years, apparently with great success; since during that time he has not lost a single patient,—a very extraordinary circumstance, even allowing that several of the cases were not severe. He states, that he has himself been surprised at the celerity with which the alarming symptoms were, as it were, extinguished after the administration of this salt. He has not recognised in calomel the efficacy ascribed to it by several distinguished practitioners. The first objection to its employment is that it acts too slowly; the second, its action upon the lymphatic system, when administered in large doses or repeatedly, or for a long time. In the latter case he believes that it renders the fibrine of the blood less plastic and more watery, and the children become cachectic and dropsical.

As croup owes its existence to an inflammatory irritation of the mucous membrane of the air-passages, which induces a profuse secretion of lymph, or mucus susceptible of being converted into false membrane, moulded on the laryngeal and tracheal canal, the first indication is to rescue the patient from the imminent danger of suffocation by clearing the air-passages from the mucus with which they are filled, and the false membrane, by which they are lined. This is not effected by means of calomel, unless at the same time be employed its ordinary adjuvants, as blood-lettings, emetics, rubefacients, vesications, and revellents; while the sulphate of copper in a large majority of cases is alone successful in effecting this object.

A full dose of the salt, that is, one, two, or three grains, produces immediately, or at the end of some minutes, violent vomiting, which forcibly detaches the false membranes; and, however insufficient the dose may have been, it is unnecessary to administer a second. Other emetics, on the contrary, when given in a large dose, often occasion *hyperemesis*, their action continues long, they induce diarrhœal symptoms, always useless, often dangerous, and in no case do they act according to the representation of Droste, so efficiently as the sulphate

of copper. In a small dose, blue vitriol maintains a slight uneasiness, which terminates in profuse transpiration, or vomiting, which finally detaches the rest of the plastic exudation, which is heard wavering in the windpipe and *bronchi*. The voice then becomes clear, and respiration is more easy.

Weinhold admits that copper in a small dose, that is, in a dose too weak to excite vomiting, exercises no deleterious influence on the organism, but that it becomes dangerous when vomiting follows its administration. The contrary proposition appears to be the true one; for in a small dose it is absorbed, and gradually induces danger, especially if the organism be not accustomed to resist the injurious influence of external agents, unless, it is added, the remedy be administered in the homœopathic dose, in which case, though it does no benefit, because in the infant *belief is inert*.

Dr. Droste does not allow with Dr. Hoffmann, that the employment of the sulphate of copper supersedes the use of other remedies, as local bleeding by means of leeches, if the symptoms demand such remedies. In point of fact, in his cases, he orders not only local bleeding, but the application of blisters. He employs also powder of *digitalis*, or tartrate of antimony as antiphlogistics, subcarbonate of ammonia as an expectorant, purgative glysters, and the *potio Riverii* in some cases, and *spiritus Mindereri* in others.

The method of treatment consists in giving at the commencement one grain of blue vitriol to an infant under two years, two grains to a child of from two years to four, and three grains to a child between that period and eleven; a dose which is followed by almost immediate vomiting. If by this method the symptoms are not entirely subdued, sulphate of copper is then given in doses of one-fourth or one-half of a grain every two hours, according to its effects and the abatement of the disease. Of these small and subsequent doses, it appears from the cases to be rarely requisite to give more than three or four.

Such are the reported effects of this remedy and method of treatment, as represented by Dr. Droste. It is much to be desired that the author had been a little more detailed and particular as to the exact characters of the cases, as to whether he had really never failed in curing croup by this remedy, as to the subsequent course of the cases, and whether any effects were left by the action of the blue vitriol upon the stomach. We must say, that a detail of the effects of a remedy in which there had been some unsuccessful cases would have been more calculated to produce a favorable impression than one in which there are no instances of failure. Cases of invariable success inevitably lead to the conclusion, that many of them must have been very slight, and that the remedial agent employed had little to do with the result. They prove, in fact, too much.—*Edin. Med. and Surg. Journ. July*, 1835, *from Heidelberg Clin. Annals, Vol. X. No.* 2, 1834.

4. *On the Changes produced in the Composition of the Blood by repeated bleedings.* By Thomas Andrews, Esq.—The object of the following experiments is to determine with precision the changes which are produced in the composition of the blood by repeated abstractions of large quantities of it from the general circulation. In the human subject, opportunities seldom occur of procuring proper

specimens for examination, although the operation of venesection is so frequently performed; as in those cases where it requires to be repeated at short intervals the blood is generally in a morbid state. Instead of waiting for such casual occasions, I directed my attention to those animals in which the composition of the blood is nearly the same as in man, conceiving that similar results would in either case be produced. I selected the blood of calves for the purpose of experiment; and as it is the practice of butchers in this country to bleed these animals several times before they are slaughtered, I availed myself of this circumstance to procure suitable portions of blood. The animal is bled from a large orifice in the jugular vein, till symptoms of syncope appear, and the operation is in general repeated at intervals of twenty-four hours. It is once fed between each operation upon a mixture of meal and water, but this is often omitted before the last bleeding.

The appearance of the blood becomes greatly altered by the successive abstractions; the crassamentum is at first very large, and a portion of the red globules are unattached to it, but it progressively diminishes in bulk, while its consistency increases, till upon the fourth bleeding it appears a small contracted ball immersed in a large quantity of serum, adhering to the stopper of the vessel in which it is contained, and presenting on its external surface an exact cast of the interior of the vessel.

The following analyses were performed by the same method that I formerly employed in a set of experiments on the blood of cholera patients, which were published in the Philosophical Magazine for September, 1832. They are nearly all a mean of two separate analyses, which seldom differed from each other more than 0·5 per cent.

A calf was bled four times; between the first and second bleedings a week elapsed, but the rest took place at intervals of twenty-four hours, and the animal was fed between each operation. The composition of the serum and blood at each bleeding is exhibited in the following tables:

SERUM.

	FIRST.	SECOND.	THIRD.	FOURTH.
Water - - - - - - -	92·19	93·96	93·81	94·18
Albumen and Salts - -	7·82	6·04	6·19	5·82
	100·00	100·00	100·00	100·00

BLOOD.

	FIRST.	SECOND.	THIRD.	FOURTH.
Water - - - - - - -	81·36	85·49	87·41	89·25
Albumen and Salts - -	6·89	5·50	5·77	5·52
Red Globules and Fibrin	11·75	9·01	6·82	5·23
	100·00	100·00	100·00	100·00

The serum had at the third bleeding a specific gravity of 1·020, and at the fourth, of 1·017. At the third bleeding, the specific gravity of the blood itself, was 1·031.

The next calf whose blood was examined was nine weeks old. I did not procure any blood from the first bleeding. The third bleeding was twenty-four hours after the second, and during that period the animal was once fed; twelve hours afterwards it was bled a fourth time, but it received no more food:

SERUM.

	SECOND.	THIRD.	FOURTH.
Water - - - - - - - - - -	93·32	94·39	94·59
Albumen and Salts - - - - -	6.68	5·61	5·41
	100·00	100·00	100·00

BLOOD.

	SECOND.	THIRD.	FOURTH.
Water - - - - - - - - - -	82·05	89·14	88·92
Albumen and Salts - - - - -	5·85	5·29	5·06
Red Globules and Fibrin - - -	12·10	5·57	6·04
	100·00	100·00	100·00

The albumen and salts, it is evident, decrease at each bleeding; the diminution is, however, very variable, and even after the fourth time does not amount to one per cent. and a half. In the globules, the same diminution takes place, but to such a degree that they are at least reduced to less than one-half their original quantity. To this principle a remarkable exception occurs in the composition of the blood taken at the last bleeding of the second calf, where the globules are slightly increased above the preceding analysis; but it will be observed that the animal received no food during the intervening period, from which the blood might obtain a fresh supply of serum, while the tendency of the different excretions of the animal was to drain from the circulating mass its aqueous part, and thus to increase the apparent quantity of the globules. This explanation is confirmed by the following analysis.

A calf, three weeks old, was bled twice before it was killed; twelve hours elapsed between the two bleedings, during which time it obtained no food:—

SERUM.

	FIRST.	SECOND.
Water - - - - - - - - - - - - - -	92·48	93.35
Albumen and Salts - - - - - - - - -	7·52	6·65
	100·000	100·00

BLOOD.

	FIRST.	SECOND.
Water - - - - - - - - - - - -	82·48	83·47
Albumen and Salts - - - - - - - -	6·70	5·95
Globules - - - - - - - - - - -	10·82	10·58
	100·00	100·00

The globules have here, it is true, diminished at the second bleeding, but so slightly, that we may attribute this circumstance to the unassimulated chyle which must have been present in the system. In the former case, the animal had been exhausted by previous depletions, and hence possessed no store from which the blood could derive even a small portion of serum, as in the latter instance.—*Records of General Science.—Ibid.*

5. *Researches on the Blood.* By L. Gmelin and F. Tiedemann.—Observers have differed with regard to the presence of carbonic acid in the blood.

Vogel found that under the receiver of an air-pump, lime water was acted on by the disengaged carbonic acid.

Scudamore obtained in the same way, by means of barytes water, a precipitate of carbonate of barytes, equivalent to ⅛ or ¼ cubic inch of carbonic acid gas, from six ounces of blood.

Brande procured from one ounce of arterial or venous blood 2 cubic inches of carbonic acid.

On the other hand, Darwin could detect no such acid; and Dr. Davy asserts that it is neither extracted during the spontaneous coagulation of the blood, nor by the air-pump, nor by coagulating the serum by heat, and that serum absorbs carbonic acid in greater quantity than pure water, which would not be the case if it was charged with carbonic acid.

Gmelin and Tiedemann examined with great care the blood of a dog taken from the femoral vein and artery, and placed in different tubes under the receiver of an air-pump. The result was that neither carbonic acid nor any other permanent gas was extricated. To ascertain the accuracy of Davy's statement with respect to the absorbing power of blood being greater than that of water, carbonic acid was allowed to stand over arterial blood for five days, when it was ascertained that 100 measures of blood absorb 120 of carbonic acid. The coagulum appeared blackish-red, and the liquid portion was extremely clear.

Since blood contains no free carbonic acid, it was necessary to ascertain whether any existed in it in a combined state. Vinegar was added to each of the kinds of blood which had been collected, as in the former experiment, with every precaution to ensure accuracy, and was placed under a receiver. A quantity of carbonic acid escaped from both, more abundantly from the venous than the arterial. The arterial blood mixed with vinegar, as well as the venous blood, left over mercury for three weeks, was converted into a blackish brown mass, without being separated into serum and coagulum.

About the same period, without a knowledge of the Heidelberg experiments, Ed. Ch. F. Stromeyer obtained the same results.

How do these facts agree with the present theories of respiration?

Lavoisier conceived that without coming in contact with the respired air, a liquid consisting principally of carbon and hydrogen is absorbed through the pulmonary membranes in the bronchi, and is converted into carbonic acid and water through the oxygen of the inspired air. As this theory does not render it necessary to suppose free carbonic acid in the blood, it is not at variance with the observations of Gmelin and Tiedemann, but the passage of gasses into moist animal membrane, and also the immediate contact between air and blood, cannot well be doubted of. Davy inferred from his results that air passes through the moist coats of the pulmonary vessels, and is taken up by the serum, the oxygen partly forming with the carbon of the cruor carbonic acid, and partly combining with the cruor. When he found that after the inspiration of hydrogen some carbonic acid was expired, though much smaller in quantity than after the inspiration of air, he concluded that venous blood contains some free carbonic acid. According to the observations already given, it appears that the arterial and venous blood contain no free acid, but carbonic acid combined with alkali. And if we suppose acetic acid to be formed in respiration, (for we find it in the blood and in most organic liquids which are exposed to the influence of air in combination with alkalies,) then must the venous blood contain more alkaline carbonate than the arterial, when by the formation of acetic acid a portion of the alkaline carbonates will be converted into acetates.

By means of a barytes solution in an exhausted receiver, they estimated that 10,000 parts of arterial blood contain 8·3 of combined carbonic acid, and 10,000 parts of venous blood 12·3 of acid in the same state, being in the proportion of 2 to 3.

They sum up their views of respiration in a few propositions:—

1. That in the pulmonary cells inspired air is absorbed into the moist membranous vessels, and is thus brought in contact with the blood.

2. The azote of the air is not sensibly absorbed by blood, but almost the whole of it remains in the cells. On the contrary, as oxygen is taken up by the blood abundantly, it flows out of the cells into the vessels in proportion to its absorption, and the mixture of gas remaining in the lungs, must therefore contain more azote and less oxygen than the air.

3. The oxygen taken up by the blood combines partly with carbon and hydrogen, and forms carbonic acid and water, and partly unites with the solid organic compounds contained in the blood. From these proceed acetic or lactic acid, which combines with a portion of carbonate of soda contained in the blood, and drives its carbonate acid into the cells.

4. The acetate of soda loses, in its course through the different secreting organs, its acetic acid, combines again with carbonic acid, after undergoing many decompositions in its passage with the mass of blood through the body, and enters into the lungs on its return as carbonate of soda.

Is urea contained in the blood after the extirpation of the kidneys?

The authors directed their attention to this point; which it is well known has been decided in the affirmative by Prevost and Dumas, (*Ann. de Chim.* xxiii.)

On the 14th January, 1832, the right kidney of a dog was removed, and in fourteen days the wound healed.

The left kidney was cut out on the 11th of February, and on the 13th the animal died. The substances taken from its body which were subjected to examination, were—1. The liquid vomited; 2. The blood collected from the great vessels, amounting to two ounces; 3. The bile; 4. The contents of the small intestines. All these substances were dried separately on the water bath, and digested by hot water. The filtered liquid was precipitated by acetate of lead, and the lead removed by carbonate of ammonia. The fluid was evaporated to dryness, and treated with absolute spirits. The residue, after evaporation, was dissolved in a little water, and evaporated with nitric acid in a glass tube. The solution from the blood produced, with a drop of nitric acid, a yellowish, white crystallized precipitate, which was collected on a filter, washed with cold water, and dried. A portion of it heated in a platinum spoon, left a trace of carbon; another part, heated with potash, disengaged no ammonia. A third portion was heated with water and carbonate of barytes. The mixture was digested with absolute spirits, and filtered. This liquid, which was not precipitated by sulphuric acid, gave by spontaneous evaporation, long colorless needles, weighing two milligrames. They were soluble in water and spirits; were dissipated by heat, and precipitated by nitric and tartaric acids; they consisted therefore of urea.

From the vomited matter urea was procured, but in such small quantity as with difficulty to be appreciated. A brownish flocky precipitate was obtained from the bile, not completely resembling urea. No precipitate could be detected in the contents of the small intestines, or from the fæces.

Thus the result of the German chemist's researches is, that urea can be formed without the aid of the kidneys. The French chemists, Vanquelin and Segalis, found no urea in the blood of a dog forty-eight hours after the extirpation of the kidneys; a circumstance which is probably to be ascribed to the short period which elapsed between the operation and the experiment.

No urea, or sugar of milk, in healthy blood.

Ten pounds of fresh blood from the cow, evaporated to dryness in the water-bath, were digested with hot water, and again evaporated. The residue was taken up by water, and precipitated by acetate of lead. The filtered liquid was precipitated by carbonate of ammonia, and evaporated to dryness, and the residue digested with absolute spirits. The latter process was repeated, when, by evaporation, a combination of soda, with a fatty acid, remained.

In the solution of the residue, nitric and oxalic acid occasioned no precipitate of urea, but they separated the fat acid (acid of oil.) It should be observed, that by this process they had previously ascertained 2-500 of urea, and 1-100 sugar of milk, to be appreciable. It appears, therefore, that cow's blood contains neither urea nor sugar

of milk, or at least in extremely minute quantity.—*Ib. and Poggendorf's Annalen.—Ibid.*

6. *Physiological and Chemical Researches on the blood of the Vena Porta.*—The first No. of the forty-fourth volume of *Rust's Magasin* contains an account of some highly interesting researches by Professor Schultz, respecting the chemical and physiological differences between the blood of the vena porta, and that of the arteries and other veins. The following is a succinct summary of the results, as given in the *Gazette Med. de Paris*, (15th Aug. 1835.)

1st. The blood of the vena porta is in general blacker than other venous blood, although this difference is not always manifest to the sight; it is not reddened by the neutral salts, or exposure to the atmosphere, or by the action of oxygen.

2nd. The blood of the vena porta does not generally coagulate, but when it does, the coagula are less firm than those of the other arteries. In those cases in which it has coagulated, it liquifies entirely or partly at the end of from twelve to twenty-four hours, and produces, as well as that which does not coagulate, a black sediment, upon which is formed clear serum.

3d. The blood of the vena porta contains on an average, when fresh, 5.23 per cent., and when dry, 0.74 per cent. less fibrine than the blood of the arteries and the other veins.

4th. The liquid blood of the vena porta contains generally a little less solid matter (0.18 to 0.3 per cent.) than the arterial blood and the other venous blood.

5th. Its serum contains generally 1.58 less solid matter than the arterial serum, and 0.80 less than that of other venous blood. In the dry state, the first is of an ash-gray, the second yellow, the third greenish-yellow.

6th. The blood of the vena porta contains proportionately more cruor and less albumen; the contrary is the case in the arterial blood; the dry cruor of the vena porta is brownish gray, that of the other veins deep red, that of the arteries bright red.

7th. The blood of the vena porta contains in its solid parts almost twice as much fat as that of the arteries and the other veins. The proportion is as follows:

Blood of the vena porta, - - -	1.66 per cent.
Arterial blood, . - - -	0.92 "
Venous blood of the other veins, - -	0.83 "

8th. The dry serum of the vena porta contains but 0.27 per cent. more fat than the dry serum of the arteries and the other veins.

9th. The albuminous cruor of the vena porta contains 1.11 per cent. more fat than that of the arterial blood, and 1.21 per cent. more than that of the blood of the other veins.

10th. It is in the fibrin that this difference is the greatest. The dry fibrin of the vena porta contains 10.70 per cent. of fat; that of the arteries 2.34 per cent., so that the difference is 8.36 per cent.

11th. The fat of the blood of the vena porta is blackish brown and unctuous; that of arterial blood and other venous blood white, or yellowish-white and crystalline; that of the white chyle to two-thirds liquid and one-third crystalline.

7. *Case illustrative of the influence of the Ophthalmic Branch of the Fifth Pair of Nerves over the Nutrition of the Eye.*—The morbid phenomena observed in the following case, seem to afford additional confirmation of the opinion entertained by physiologists with regard to the influence exerted by the ophthalmic branch of the fifth nerve over the nutrition of the eye; they nearly correspond with those observed by M. Magendie during his experiments on rabbits, and also with those described by M. Serres, as having occurred in a similar case treated by him.

The principal facts connected with the case now to be noticed, are the following.—William Jolly, three years of age, was admitted into St. Thomas Hospital, under the care of Dr. Burton, on the 29th of January, 1835. The father stated, that the symptoms which his child suffered were preceded, five months previously, by a fit resembling apoplexy; and that upon the child partially regaining his faculties, his right leg and arm were found paralysed. At the time of the patient's admission into St. Thomas's Hospital, these limbs were still almost useless, and the child was unable to stand alone; the sensibility of the paralysed extremities was rather increased than diminished: the head was inclined a little over the left shoulder, in a fixed position, and any attempt to rotate it occasioned much pain. The patient could only rest in a sitting posture, with his body bent forwards, and his head supported on a pillow; and in this constrained attitude he continued five weeks, throughout the day and night, with little change to the date of his death. At the time of his admission, the body was emaciated; the abdomen tumid, and tender on pressure; the complexion pale and unhealthy; the tongue was clean and moist; the pulse at the wrists exceedingly feeble, and the action of the heart over the cardiac region proportionately weak. The child's intellect did not seem impaired; he understood the questions put to him, and his replies were intelligible, although uttered with a little hesitation; the hearing was distinct; the eyes sound, the sight perfect, but the pupils rather dilated.

No other remarkable phenomenon presented itself until about the expiration of a fortnight from his admission; at that date, a swelling and tenderness of both parotid glands, with erysipelas of the left cheek, and a small speck situated about the centre of the left cornea, appeared in quick succession. When the speck first made its appearance, there was little or no redness of the conjunctival vessels, no intolerance of light at any period; the iris was not apparently inflamed, and the movements of the left eye-ball corresponded with those of the right eye. The speck rapidly extended, and the whole surface of the cornea became opaque. The conjunctiva became more vascular, and its surface was moistened with a semi-purulent fluid; but in the course of seven days from its first appearance the secretion was much diminished, and the surface of the conjunctiva had become almost dry. Ulceration through the cornea advanced; and within the laminæ of the inferior half of its disk a purulent fluid had collected, which eventually escaped through the perforation, and projected in the form of a brown-colored conical scab, about one-eighth of an inch from the surface of the cornea. The globe of the eye was now discovered to have entirely lost its perception of external stimuli; no symptoms of uneasiness, and no movements of the eye-lids,

followed, when the globe was touched in the first instance by the finger, nor when subsequently touched with lunar caustic. The child could, however, still move the eye-lids, and their movements corresponded, as before remarked, with those of the other eye. The sensitiveness of the left cheek was natural; and from the desire which the child manifested for strong beef-tea, in preference to weak mutton broth, it was inferred at least one of the gustatory nerves was not paralysed; but owing to the distress exhibited by the patient whenever any attempt was made to move him, and the difficulty of making him comprehend the necessary questions, it was not ascertained whether the left nostril and left half of the tongue were paralysed or healthy.

The ulceration continued to progress from the first appearance of the speck about nine or ten days; the eye then burst, and the humors were discharged. A considerable hæmorrhage also followed, and an eruption of petechiæ was then for the first time noticed on the lower extremities. All the symptoms now became rapidly worse. In the course of a day hæmorrhage followed from the bowels, the puerpera ascended over the trunk and upper extremities, and the child sunk exhausted, but only imperfectly comatose, about twenty days after the first appearance of the speck.

Upon examining the contents of the cranium, thirty hours after death, the dura mater was found to be marked with petechiæ over the upper circumference of the cerebrum; and a scrofulus tubercle adhered, or had grown out of the anterior superior surface of that portion of the dura mater which forms the tentorium; in other respects this membrane was healthy. The arachnoid also seemed perfectly free from disease, and the brain firm but not hard. A small quantity of a thin fluid, tinged with blood, was effused between the arachnoid and pia mater, at the upper circumference of the brain. A little fluid was found in both the lateral ventricles, and a loose coagulum of blood in the posterior cornu of the right ventricle. About f. ʒj. of loosely coagulated blood was also extravasated between the convolutions of the left hemisphere of the cerebrum. Many small scrofulous tubercles were discovered in the cerebrum, about the size of peas; two others much larger, about three-quarters of an inch in diameter, were also found in the cerebellum; and one of the same dimensions nearly was situated about the posterior inferior portion of the pons varolii. The circumference of this tubercle was placed within the distance of one line from the apparent origin of the fifth nerve, on the left side of the pons varolii. The brain was carefully examined by Dr. Barker and Dr. Burton, but no other disease could be discovered either in the course of the fifth nerve, on the same side as the tubercle, or in the left cavernous sinis, or in the left orbit. As, however, the phenomena attending the ulcerative process in the above case nearly corresponded with those described by M. Magendie and M. Serres, to have followed the destruction of the healthy functions of the fifth nerve in their cases, we may ascribe the corresponding set of phenomena observed in the eye of W. Jolly to a similar lesion; and in the absence of direct evidence to the contrary, it may be attributed with much probability to the morbid action which occasioned the growth of the tubercle, noticed immediately beneath the apparent origin of the fifth nerve, on the left side of the pons varolii.

The cachectic condition of the fluids and solids of the body was well exemplified by the joint existence of puerpera and scrofulous tubercles to a remarkable extent. Capillary extravasation was observed in the three great cavities of the body, the cranium, chest, and abdomen; and all the principal organs were in a state of scrofulous derangement. The tubercles were as generally distributed in the case of W. Jolly, as they appear to have been in the case described by Mr. Earle, in the third volume of the Medico-Chirurgical Transactions. The abdomen, in particular, presented the characters noticed by Dr. Baillie (page 208, vol. 1, Wardrop's edition,) and the peritoneum and mesentery were thickly studded over with small scrofulous tumors.

The scrofulous habit predominated throughout the family. Of six children, including the patient, William Jolly, five had died about the age of 3 years; the sixth is not likely to thrive; and the mother died, after a protracted illness, in child-bed.

The treatment adopted in the above case was essentially palliative. Temporary alleviation only of the symptoms was derived from the use of remedies; and at the admission of the patient little hope was entertained of his recovery.—*London Medical Gaz. June 6th*, 1835.

8. *Observations on Malignant Pustule.—Hufeland's Journal* for October, 1834, contains some highly interesting observations by Dr. Wagner, on the communication of malignant pustule from diseased animals to the human species. Dr. Wagner having heard that on the 22d July, 1834, two persons in the village of Striesa, in Prussian Saxony, had died suddenly—that several others had fallen sick, and that in one farm seven head of cattle, with several pigs, had burst, immediately went there, where he collected the following details respecting the event.

On the herd of cattle returning from pasturage, July 13th, the bull fell suddenly prostrate, and was unable to rise again. At first it was attributed to a simple wound in the back-bone; he was immediately killed, and two peasants, Stack, the gardener, aged 40, and Zeinz, the vine-dresser, aged 30, both robust men, and in excellent health, skined, cut up, and pertook, with several others, of the flesh of the animal as food. Some days afterwards, several other animals belonging to the same farm fell sick in the same manner, shared the same fate, and their flesh was used as food by the same persons. All of them, however, quickly began to complain of uneasy sensations, heaviness in the precordial region, occasional pains in the abdomen, vertigo, etc., especially Stack and Zeinz, who had not only partaken of the flesh of the infected animals, but had handled them, and in so doing, had been wounded in the hand.

Several more animals suddenly burst on the 15th and 18th. On examination, the abdomen was found inflamed, the spleen gangrenous and putrescent, consisting but of a membrane in form of a sac, containing a thick, black liquid; in several places under the hide, especially about the neck. were œdematous tumours. No doubt could now exist, that the malady was the true carbunculous affection. M. Wagner gives it the name of "gangrene of the spleen, (*Milzbrand;*)" from the state of that organ as found in all the infected individuals

examined; and to the septic humour which appears to generate the malady, "virus of gangrenous spleen, (*Milzbrandgift.*)

On the 19th, the gardener Stack, though suffering for some days, endeavored to walk a distance of three leagues, which, with the utmost difficulty, he accomplished. After having endeavored to recruit his feeble state with a draught of malt liquor, he made an effort to return, but was seized with vomiting, pains in the abdomen, and fell prostrate on his back. He was carried home; icy coldness of the extremities, thence to the trunk, supervened; diarrhœa of black liquefied blood; convulsive movements of the head and limbs; legs blue and livid; nose sharpened; eyes hollowed; with great suffering in the abdomen, and repeated vomiting; but death relieved him on the 20th.

On the same day, the widow Gaertner, who had eaten of the meat, was affected much in the same manner; a black pustule also had appeared on one of her thighs. She was found dead in her bed on the following day, with a child still sleeping beside her and in perfect health. On the 22d the decomposition of these two bodies was advanced nearly to liquefaction, and, therefore, precluded examination.

Eight other persons who had either come in contact with the infected animals, or had eaten of their flesh, were attacked with the epidemic on the 22d of July, and a ninth on the day following. The general symptoms and sufferings were nearly the same in all. There was dryness of the skin; small, febrile, scarcely perceptible pulse; tongue not loaded; eyes natural, and body red and warm; no delirium. Some experienced a sense of pressure at the epigastrium, which was not, however, increased on drawing a full breath; most of them had a sweetish taste in the mouth; all had inappetence; two only were affected with vomiting; none of them had meteorism and tension of the abdomen. Some suffered anxiety, especially the vine-dresser, Zeinz, who, with the exception of a sensation of numbness in the affected thigh, did not complain of any more pain than the others. The anthrax in this individual had no inflammatory circle; it was surrounded by an induration, was sensible to the touch, of an oblong form in the direction of the limb, and extended in depth to the bone. The pustule commenced in a small spot the size of a pin's head, and extended without causing any pain, and had become entirely dry.

The second patient, who had a pustule on the thumb, likewise had no general symptoms; but he had a sensation of burning, with tumefaction and erysipelatous inflammation of the affected hand, which extended to the forearm, although the anthrax was scarcely the size of a ten-cent piece.

With the exception, also, of a young woman, who ate of the infected meat, and in whom a pustule formed on the right forearm, with tumefaction and inflammation extending to the elbow, the other patients had no pustular eruption.

As the malady with most of these persons had already been of some days' duration when M. Wagner arrived, he found no indications requiring vomits. Those who were yet free from anthrax, he administered the most simple remedies; cataplasms of linseed and flour of bran in white wine-vinegar, applied to the precordial region, infusion of fennel, or simply water acidulated with white wine vinegar, to pro-

mote and sustain a moderate perspiration; abstinence as far as possible. With those in easy circumstances, and with those also, in whom carbuncles were developed, a more active treatment was necessary. An incision cross-ways was made in the pustules, and, with respect to Zeinz, to the depth of half an inch, cauterised, and the wound sprinkled with strong caustic potass. During nearly the whole operation he was insensible, but was at length painfully conscious of a pricking and burning sensation; the gangrenous scab, which was hard and dry, softened and sunk; a cataplasm of linseed and powdered oak bark in white wine vinegar was applied; small doses of camphor, and a strong decoction of quinquina mixed with a little of Hoffman's anodyne liquid mineral.

All the infected were better the next day (24th except one, an old woman, with a pustule on the thumb, which had been cut and cauterised. Every symptom aggravated; the whole arm swelled and inflamed to the shoulder; the forearm covered with reddish-blue vesicles; face red and burning; intense fever; diarrhœa; extreme prostration; skin dry and hard; sweetish taste in the mouth. Considering this case as altogether hopeless, M. Wagner only applied a cataplasm of new cheese to the wound.

In place of the gangrenous scab on the thigh of Zeinz there was a hollow, half an inch deep, circular and blackish, edge narrow and red; fever gone; appetite, strength and spirits returned. This rapid amendment was preceded by a general and profuse sweat of infectious odour. The wound was sprinkled with quinina and caustic potass, dressed with Baum Arcœus, and covered with the vinegared cataplasm; internal treatment as before.

29th. Sensibility restored to the infected member, but the gangrenous hollow was of twice the depth, and no separation could be discerned between the unhealthy and the sound. It was now dressed with powdered quinquina, balsam of Peru, brown ointment mixt with myrrh and camphor, and again covered with the vinegared cataplasm.

Aug. 1st. The gangrenous sloughs were separated with the bistoury; the wound was now three inches in length, two and a half in circumference, and three quarters in depth, of a clear red, and secreting laudable pus.

5th. Begins to be covered with fleshy pimples and granulations of good appearance.

11th. The whole excavation filled with them; occasional torpor in the feet, followed by a pricking sensation.

14th. Cold tumefaction of the integuments of the limb extending to the abdomen. Application of bags of warm bran; the fleshy pimples have pustulated to such a degree as to require the use of the caustic potash.

18. Cicatrisation of the wound beginning, and will, no doubt, be soon completed.

The old woman, whose case had been considered as utterly hopeless, on the 25th, two days afterwards, rallied considerably, to the great astonishment of M. Wagner. No critical perspiration had here supervened, but the diarrhœa was so excessive that the stools were passed without consciousness. The gangrenous pustule was suppurating the vesicles on the fore-arm had sunk, and the swelling subsided from top to bottom. Same treatment external and internal

as in the preceding case. The general state of amendment proceeded, and so rapidly, that on the 29th of July she could walk above a mile. The local affecton was more tardy; the pustule extended all round the thumb to the back of the hand; the scab, though superficial, was hard, horny, dry and black, and when a part of it detached itself a few days afterwards, the suppurating surface beneath emitted a fœtid odour. It was dressed with powdered quinquina, and shortly afterwards bore a favorable appearance, and thus continued to do; and on the 4th Sept. the cure was completed.

On the 6th of August two more patients presented themselves, although eight days had elapsed, during which no case of infection either in man or brute had occurred and every precaution was in use to prevent the spread of the epidemic. The persons affected were two fellow servant women on the same farm, the one 26, the other 50 years of age; and though they had been many times in contact with the infected animals, they had never eaten of their flesh. The elder woman, it appears had, while standing beside the infected old woman above mentioned, been stung by a fly in the inner side of the left arm. The little puncture became painful, swelled, and inflamed, and at length assumed the appearance of a dry and livid pustule. The younger woman could not give so decided an origin to the pustule which formed on the outer side of the right arm; it was surrounded with gangrenous vesicles, swelled and inflamed from the elbow to the shoulder; but it is necessary to state, that the hide of an infected animal had been found in her chamber. Might not this have been the origin? Might not some particles of the flesh or cellular tissue have been still adherent to the skin, and in its recent state have attracted the flies, whose puncture would then most certainly transfuse the virus? Such facts have been before observed, and examples of them are cited by Bertrandi and Monteggia.

Recourse was had to the same internal treatment as in the preceding cases; but as it was too late to incise the carbuncles, and M. Wagner having found that cauterisation after incision extended the gangrene, he only applied cataplasms of new cheese, or of bran and linseed. The internal remedies were also soon changed, and a beverage of curdled milk substituted, mixed with water, or an infusion of fennel.

The young woman's fever was of an inflammatory character; and pains in the chest supervening she was bled in the arm. The state of the pustule rendering the application of caustic potass necessary, it was tried, but soon removed, the pain arising from it being too excessive to be borne.

On the 13th of August, after profuse perspiration, the general symptoms, and also the swelling and inflammation around the pustules, subsided with both the patients.

Three weeks after the first appearance of the epidemic, another and fatal case of infection presented itself.

A young man, 20 years of age, servant on the same farm with the females above mentioned, had not only handled infected animals, but had eaten of their first flesh. Nevertheless, he continued in good health for a fortnight after the appearance of the malady; he was then seized with all its symptoms; a pustule on the forepart of the left

arm spread an inch and a half in two days. Profuse sweat ameliorated all the symptoms for a short space, but on the 18th they returned, and with such violence, that on the evening of the same day he breathed his last.

In two villages adjacent to Striesa a few isolated cases of the infection were at the same time observed. Four men in the prime of life, who had not only been in contact with infected animals, but had partaken of the flesh as food, were seized with all the symptoms of the epidemic, but recovered in the course of three weeks.

The following experiment is noticeable. Some fat of an infected animal was melted and thrown to two pigs, two dogs, and two cats; all of them burst while rolling on the grass, which they appeared to do for relief.

From the foregoing facts the author draws these conclusions:—

1st. That the greater or less violence of the malady depends not so much on the presence, number, and size of the pustules, as on the concomitant fever; the pustules being but a product or symptom of the malady, and may be altogether wanting, and the latter still exist.

2d. The carbuncular fever, or gangrenous splenitis, with or without pustules, does not propagate itself by means of miasma in the air, but communicates itself by the ingestion of the flesh of infected animals, by contact with them, and by cutaneous absorption. The animal virus, which appears to be the principle of the malady, is fixed, unalterable, not to be decomposed by any process of cooking, as the foregoing statements prove.

3d. Whether the pustules be excised, cauterised, or not touched at all, the concomitant fever and inflammation proceed in their course, and the duration of the treatment is in no degree abridged; but experience demonstrates that violent measures oppose the curative efforts of nature, and may prolong the malady. If the infection be received internally, excision and causterisation are useless; if on the exterior surface they are only useful in the first state of the pustule, when yet very small; and it is rare that medical assistance is sought. The topical remedies which proved most serviceable to M. Wagner were warm emollient cataplasms, or those of new cheese, powdered quinquina, alone, or mixed with powdered charcoal. It is doubtful whether the administration of quinquina and camphor internally be really useful. But, under whatever treatment, the pustule remains ordinarily from four to six weeks; when the infected die it is frequently during a febrile paroxysm. In a slight attack, a vomit has often proved completely efficacious. Milk drunk in great quantity soon after the ingestion of the infectious substance is of use by provoking sickness and vomiting.

M. Wagner attributes the frequency of carbuncular affections, so observable in summer in the Circle of Schweintz, where he practices, to the great number of pools and ponds of stagnant and filthy water in the vicinity of the Elter, and which evaporate during the great heats.—*Gazette Med. de Paris*, 28 Feb., 1835.—*Ibid.*

9. *Remarks on Cough.* By Robert J. Graves, M.D.—Permit me, gentlemen, to make a few observations here on what is properly termed cough. What is cough?—A sudden and violent expulsion of

air from the lungs, produced by forcible contraction of the diaphragm, aided by the abdominal and other expiratory muscles. What is the cause of cough?—Pulmonary irritation. What is the nature of this pulmonary irritation?

Here, gentlemen, is a question which every practitioner should put to himself when called on to treat a case of cough, and what affection is there which so frequently demands our assistance and tasks our ingenuity? How abundant, how varied, are the examples of cough we meet with in our daily practice! How obscure do we not find its nature on many occasions, and how difficult and perplexing its treatment! Where the source of irritation is manifest, where the nature of the disease is simple and easily detected, where, after a proper examination, we can point to some part of the respiratory system, and say, here is the seat of the disease; in such cases, indeed, our course is sufficiently clear, we may proceed with confidence, and practice with success. But how often are we, after weeks and even months of close and painful attention, baffled in our best directed efforts, and forced to admit the humbling conviction that all our remedies are inefficient and useless, and that our character, as well as that of the profession, is likely to suffer in public estimation? How often, too, do we discover with surprise, that the cough which we have been treating for weeks as a pure pulmonary affection, depends not on any primary derangement of the respiratory system itself, but upon the irritation of some distant organ, or upon peculiar conditions of the whole economy?

Before I proceed to inquire into the nature of the various sources of pulmonary irritation producing cough, I wish to remark that the exciting cause, or, in other words, that which immediately precedes and seems to give rise to a tendency to cough, is a sensation of tickling in the mucous membrane of the trachea, close to its bifurcation, and opposite the hollow at the fore part of the neck. It is also a curious fact that this sensation of tickling or itching is peculiar to this situation, being never felt in any other part of the pulmonary mucous system. Whether the disease be seated above, as in case of laryngeal affections, or whether it be below, as in case of disease of the lining membrane or parenchyma of the lung, it is here alone that the tickling sensation is felt. Another circumstance equally remarkable and equally difficult of explanation, is the effect of position in cough. Persons laboring under slight bronchitis, or rather slight inflammation of the trachea, who scarcely cough half a dozen times during the course of the day, will, the moment they lie down at night, be seized with a violent and harassing cough, which may last for several minutes, and sometimes for hours, with little intermission. We can easily understand why empyema or pneumonia of one side of the chest may produce cough in certain positions and not in others, for here we have an obvious physical cause; the accumulated fluid in the pleural cavity in the one case, and the diseased lung, whose specific gravity has been much increased by solidification, in the other, exercise an inconvenient degree of pressure on the sound lung, and hence give rise to irritation and cough, particularly in those positions which favor the operation of these physical causes of irritation. Here, however, the cause of irritation is very obscure. It may (but this I merely offer as an hypothesis) depend on the fluid secreted by the

mucous membrane trickling over that part of the trachea where the tickling sensation is felt, the flow of mucus to this part being favored by the recumbent position. That it does not depend on any supposed temporary congestion and irritation of the lung, from the impression made on the skin by cold bed-clothes, I am quite convinced, for I have repeatedly observed it in persons warmly dressed, from merely lying down on a sofa close to the fire. You will, therefore, bear in mind, gentlemen, that although usually, when coughing is induced by any sudden change of position, we may infer that it is connected with some serious lesion of the lungs, or pleura, yet we must not attach too much importance to this symptom in arriving at this conclusion, for cases are occasionally met with in which mere tracheal or bronchial inflammation is attended with the same symptom to a very remarkable degree.

I may observe, *en passant*, that the sensation of tickling, or itching, appears to be almost exclusively confined to the skin. Here it appears to be dependent on slight causes, apparently incapable of producing that modification of nervous sensation, termed pain. In other cases it seems to be connected with the rise and decline of the phenomena which indicate inflammatory action, arising in the first case (where it is generally less observable) from that nervous modification which precedes inflammation, and in the second being connected with some change in the nerves of the part which precedes its return to a healthy condition. It does not appear to affect the mucous tissues, except in a very slight degree, and under peculiar circumstances. It is not observed in the pulmonary mucous tissue, except at that part of the trachea which I have already mentioned, and it does not occur in any part of the intestinal mucous membrane. The only parts connected with the intestinal tube, in which it is felt, are the nose and on the anus, and here it is within the reach of scratching, the ordinary mode of relief. This is a fortunate circumstance, gentlemen, for if any part of your bowels were to itch as your skin sometimes does the annoyance would be quite intolerable. If the presence of lumbrici in the small intestines, instead of producing a troublesome itchiness of the nose, as it often does,—if it produced, I say, a degree of itching equally intense in the mucous membrane of the bowels and stomach, what patient could endure greater torments than a person so afflicted? If ascarides gave rise to as intense a degree of itching with the colon, as they occasion at the verge of the anus, how dreadful would be the suffering thus induced!

Passing over the obvious and well known sources of pulmonary irritation, producing cough, such as bronchitis, pneumonia, &c., the first cause to which I shall direct attention is one of not unfrequent occurrence, and where a mistake in diagnosis may lead to a practice useless to the patient and discreditable to the practitioner. The best mode of illustrating this is by giving a brief detail of a case which I attended with Dr. Shekleton. A young lady residing in the neighborhood of Dorset-street, was attacked with symptoms of violent and alarming bronchitis. The fits of coughing went on for hours with extraordinary intensity; it was dry, extremely loud, hollow, and repeated every five or six seconds, night and day, when she was asleep as well as when she was awake. Its violence was such that it threatened, to use a vulgar but expressive phrase, to tear her chest in pieces; and all

her friends wondered how her frame could withstand so constant and so terrible an agitation, and yet she fell not away proportionally in flesh, had no fever, and her chest exhibited nothing beyond the rales usually attendant on dry bronchitis. She was bled, leeched, blistered, and got the tartar-emetic mixture, but without experiencing the least relief. We next tried anti-spasmodics, varying and combining them in every way our ingenuity could suggest, still no change. We next had recourse to every species of narcotics, exhibiting in turn the various preparations of conium, hyoscyamus, opium, and prussic acid, but without the slightest benefit. Foiled in all our attempts we gave up the case in despair, and discontinued our visits. Meeting Dr. Shekelton some time afterwards, I enquired anxiously after our patient, and was surprised to hear she was quite recovered and in the enjoyment of excellent health. *She had been cured all at once by an old woman.* This veteran practitioner, a servant in the family, suggested the exhibition of a large dose of spirits of turpentine, with castor oil, for the purpose of relieving a sudden attack of the colic; two or three hours afterwards the young lady passed a large mass of tape worm, and from that moment every symptom of pulmonary irritation disappeared.

The next kind of cough, in which the cause of pulmonary irritation is often misunderstood, is that which occurs in hysteric females. This kind of cough is one of the most alarming diseases in appearance you can possibly witness; in some it is loud, ringing, incessant, and so intensely violent, that one wonders how the air-cells, or blood-vessels, escape being ruptured. In others it is quite as incessant, occurring every two or three seconds, night and day, but it is not very loud, and, indeed, in some it scarcely amounts to more than a constant teasing hem; in general the pulse is quick, but is the quick pulse of hysteria, not of inflammation or fever. The patient suffers no aggravation of the cough from inspiring deeply, and her countenance exhibits no proof of malaeration of the blood, on the contrary it is blanched and pallid. She complains of variable, or deficient, appetite, headache, cold feet, and irregular or absent catamenia; although the cough continues for weeks, or even months, she does not emaciate like a person in incipient phthisis, although so much disturbed by the cough, and subsisting on so small a quantity of food.

Here the history of a case, a knowledge of the patient's habit, and the use of the stethoscope, are of great value. You will find that the patient is subject to hysteria, that she is generally pale and of a nervous habit; that the attack came on suddenly, and was superinduced by mental emotion, or some cause acting on the nervous system, or else arose gradually as one of the sequelæ of catamenial disturbance, that the heat of skin and state of pulse are by no means proportioned to the violence of the symptoms, and the stethoscope will tell you that the signs of organic derangement of the lung are absent. You will thus be enabled to arrive at an accurate notion of the nature of the disease, and you will save the patient from the useless and often dangerous employment of antiphlogistic means. Bleeding and leeching are, generally speaking, injurious; such cases are best treated by stimulants, anti-spasmodics, and stimulant purgatives, together with change of air, traveling, and the use of chalybeate spa-waters.

The third species of obscure cough to which I shall direct your attention, is one of deep importance for many reasons. It is that species of cough which depends upon pulmonary irritation connected with a venereal taint in the system. That syphilis may attack the pulmonary as well as the cutaneous, osseous, mucous, and other tissues, is not a discovery of modern times; it is a form of the disease long known, and you will find it mentioned by many of the older writers. Since syphilis has been classed by Wilan and others among diseases of the skin, this notion seems to have been either abandoned or forgotten, but, as it strikes me, with very little justice. I entertain a firm conviction, that syphilis may affect the pulmonary as well as it does the cutaneous, or mucous, or osseous tissues, and that a patient, laboring under a venereal taint, may have irritation from this cause set up in the lung as well as in any of those organs in which it is usually manifested. The first person who mentioned this circumstance to me was the late Mr. Hewson, and since that time I have had repeated opportunities of confirming the truth of his opinion. Richter, Alibert, and Paget have well observed, that William and Bateman's classification of diseases of the skin is liable to the paramount objection, that it has no reference to the constitutional origin of cutaneous affections. I have the very same fault to find with modern treatises on diseases of the lungs. Pathologists have indeed inquired most accurately into the numerous morbid changes to which the pulmonary tissue is subject, but they have omitted a no less important part of their task, which is to investigate the states of constitution which originated these changes. The agency, indeed, of scrofula has been inquired into with care. but how little attention has been paid to rheumatism, gout, syphilis, and scurvy, the fruitful sources of numerous diseases of the chest.

By far the most interesting point, connected with this affection, is its diagnosis; on this every thing depends. The great importance attached to the diagnosis arises from the circumstance of this disease presenting symptoms analogous to, and consequently being frequently confounded with, phthisis. A patient comes to consult you for cough; you find him pale, emaciated, and feeble; he sleeps badly, and is feverish at night, and has a tendency to sweat. Here there may be a double source of error. If the disease be mistaken for tubercle, and mercury not given, bad consequences will result; on the other hand, if tubercles be present, the effect of administering mercury will be to precipitate the disease to a fatal issue.

What is the nature of this disease, and how are you to recognise it? Mainly, I answer, by the history of the disease. If the patient's sufferings have commenced at the period of time, after primary sores on the genitals, when secondary symptoms usually make their appearance; if some of his complaints are clearly traceable to this scource; if, along with debility, night-sweats, emaciation, nervous irritability, and broken rest at night, we find cough: and if this group of symptoms have associated themselves with others, evidently syphilitic, such as periostitis, sore throat, and eruption on the skin, then we may, with confidence, refer all to the same origin, and may look upon the patient as laboring under a syphilitic cachexy, affecting the lungs as well as other parts. In forming this diagnosis much caution and

care are necessary, and we must not draw our conclusion until we have repeatedly examined the chest by means of ausculation and percussion; if these fail to detect any tangible signs of tubercles, we may then proceed to act upon our decision with greater confidence, and may advise a sufficient but cautious use of mercury. Under such circumstances it is most pleasing to observe the speedy improvement in the patient's looks and symptoms; the fever, night-sweats, and watchfulness diminish, he begins to get flesh and strength, and, with the symptoms of lues, the cough and pectoral affection disappaer. I am not prepared to say which of the pulmonary tissues is most usually attacked by the venereal poison, but I believe that it chiefly tends to the bronchial mucous membrane, although, like other animal poisons, *e. g.*, those of measles and scarlatina, it may also occasionally produce pneumonia.

The fourth species of obscure pulmonary irritation, producing cough, is that which is connected with a gouty diathesis. Gout may attack almost every tissue in the body. We may have it in the joints, as you are all well aware of, we may have it in the muscles and muscular aponeuroses, forming what has been termed the rheumatic gout; it occurs frequently in the fibrous tissues, and I have several times observed it in the cellular substance of various parts of the body, forming either diffuse œdema or tumours, which are exceedingly tender to the touch, and which are removed by treatment calculated to relieve the constitutional affection. It may attack the heart, giving rise to true pericarditis, or else to a functional disease with palpitations, a sensation of fluttering and sinking about that organ, and very remarkable intermission of the pulse; or it may affect the stomach, occasioning dangerous spasm, or various dyspeptic symptoms; or it may seize on the intestines, producing irritation, colic, and gouty diarrhœa. I remember a patient, of a confirmed gouty habit, expressing a great deal of surprise at getting an attack of gout in the testicle, for he could not conceive how a disease, which generally affects the joints, could occur in an organ so different in its nature. I replied that the matter could easily be explained; because fibrous tissue, which gout most frequently attacks, enters into the composition of the testicle as well as that of the joints. Indeed the testicle, with reference to the texture of its envelopes and the extent of motion it enjoys, may be said to be provided with a sac-like joint. In like manner, gout very frequently attacks the mucous membrane of the trachea, or bronchial tubes, causing a dry, annoying, and often very obstinate cough. Where this cough comes on along with a fit of inflammation of the joints, its true nature is frequently overlooked, and it is believed to have originated in cold, and to be mere common bronchitis. No matter, gentlemen, what be the cause of inflammation in a gouty habit, no matter what the organ attacked by the inflammation be, it almost invariably assumes the character of true gouty inflammation. If a gouty person sprains a toe, or an ankle, matters, after progressing for a time in the ordinary way, are sure in the end to exhibit a change of character, and the inflamed parts are observed either to grow unexpectedly worse, or to become stationary at a time when a speedy termination of the local affection seemed approaching. This is owing to its being now modified by the constitutional tendency to gout, which localizes itself in the affected

part. Precisely the same relations may be often observed between common bronchitis, produced by cold in a gouty habit, and the gouty bronchitis it indirectly produces. Gouty bronchitis often becomes chronic, continuing until it is relieved by a regular fit of gout in the extremities.

The fifth species of pulmonary irritation, in which the source of the disease is more or less obscure, is that which is connected with the scorbutic diathesis. It is important to be aware of this, particularly for those who have charge of the health of the poorer classes, which is almost of more value than that of the rich, for on it their labor and their means of support depend. Among the poor, particularly in the cities where the majority live on salt provisions, the scorbutic diathesis is very prevalent. It manifests itself either in the form of puerpera, or in tendencies to hæmorrhage from the nose, stomach, bowels and bladder. It sometimes attacks the lungs, producing irritation of the bronchial mucous membrane, with cough, and spitting of blood, and occasionally gives rise to pulmonary apoplexy. It is evident that pulmonic cases of this nature, originating in a scorbutic diathesis, produced by confined air, damp lodging, and a salt diet, will require a treatment peculiar to themselves, both during the attack and during convalescence.

The last source of pulmonary irritation, to which I shall direct your attention, is that which proceeds from scrofula. You all know that scrofula has a tendency to attack every tissue in the body, but you may not perhaps be aware, that it may affect those tissues in very different ways, and that scrofulous irritation may manifest itself in various forms, from the most trifling and transitory to the most extensive and permanent. I recollect a case I attended with Dr. Jacob, in which this fact struck me very forcibly. A fine boy of high complexion, precocious intellect, and other marks of the scrofulous diathesis, got an attack of the scrofulous ophthalmia of an intense character, and it required all the skill and ingenuity of Dr. Jacob to save him from blindness. During the period of our attendance, his brother (who was also of a strumous habit,) began to complain of parts of his arm being sometimes a little sore. This circumstance attracted my attention, and on examination I found that several circular diffused swellings, of various sizes, often equalling half a crown in diameter, had successively appeared on different parts of his extremities and body. They evidently depended on inflammation of the subcutaneous cellular tissue, and exhibited a remarkable example of a most transitory local affection, produced by a constitutional cause, for these swellings arose, arrived at their acme, and subsided in the space of ten or twelve hours; they constituted, in truth, the first efforts of the scrofulous diathesis, to localize itself, and, after a few weeks' continuance, they were replaced by distinct and *fixed* scrofulous inflammation of the metatarsal bones.

Here was a very curious and instructive fact. A boy, evidently of a scrofulous diathesis, has circumscribed tumors, which arise, come to maturity of irritation, and subside in the course of a few hours. In some weeks afterwards, scrofulous irritation, in a decided and permanent form, fixes itself in the foot, producing inflammation and ulceration. From this it may be inferred, that scrofula, (for in this case I am firmly convinced these tumors were connected with

strumous diathesis) may attack parts not only in its more permanent and destructive forms, but also in a manner so trifling and so transitory, as to subside in a few hours, and leave no trace of its existence. The inferences deducible from this fact are numerous and important, for if scrofula may thus produce an acute and transitory inflammation of the subcutaneous cellular tissue, surely it may occasionally give rise to somewhat similar affections of internal organs, as the bowels, the lungs, etc., and thus may occasion an acute bronchitis, a pneumonia, or an inflammation of the mucous membrane of the intestines, totally independent of the operation of cold, or the usual causes of such affections. It has been too much the custom to refer merely chronic and fixed local inflammations to the agency of constitutional causes. The example before us proves that even the most transitory may have this origin.

Scrofulous irritation may affect either the lining membrane or the parenchyma of the lung, giving rise in the one case to scrofulous bronchitis, in the other to scrofulous pneumonia, two affections which may exist separately or combined, and either of which may prove fatal, with or without the development of tubercles in the lungs. Tubercles have, as I have elsewhere proved, too exclusively engrossed the attention of those who have investigated the pathology of phthisis; they are a very frequent product of the scrofulous diathesis, but the scrofulous bronchitis and scrofulous pneumonia are still more frequent and more important, and do not, as is falsely supposed, depend upon the presence of tubercles in the lungs. The pneumonia, the bronchitis, and the tubercles, where they occur together, are all produced by one common cause,—scrofula. Of this more hereafter.—*Ibid.*—*Ibid.*

10. *Notice of a new mode of preserving Animal Bodies.—Communicated at the Editor's request*, by Henry N. Day.—The following account of an interesting discovery, recently made in Italy, is taken from a pamphlet published in Florence, during the last summer.

The author of the discovery, Sig. Girolama Segato, is already favorably known to the scientific world, as the author and engraver of improved maps of Africa and Morocco. Ardent in the pursuit of science, he traversed the deserts of Northern Africa, and by his researches, corrected and considerably advanced the knowledge of those regions. It was while travelling in these parts, that he received the first hint of this great discovery. In the path of one of those interesting phenomena of the African deserts—a vortex of sand—which his curiosity prompted him to trace, he, one day, discovered a carbonized substance, that upon closer investigation proved to have been originally animal matter, and to have been carbonized by the scorching heat of the sand. He afterwards discovered an entire human carcass, partly black, partly of a sooty hue, about a third less than the ordinary size of man, and all perfectly carbonized. It occurred to him that this accidental process of nature, might be imitated by art, to the perfect preservation of animal substances. To discover *how*, now occupied his whole attention. At the end of some months, devoted to this pursuit, the happy thought flashed upon his mind, which was to lead him to the discovery of the desired secret. Compelled to return to Italy, by a dangerous malady brought on by

nearly a week's exposure to an unwholesome atmosphere, in a pyramid of Abu-Sir, which he had entered for the purpose of extending his scientific researches, he was obliged to intermit for a time his favorite pursuit; but after regaining his health, he again gave himself to it with renewed ardor; and after a short time succeeded, to the highest degree of his most sanguine expectations.

The following are some of the results obtained by the discovery.

Entire animal bodies yield as readily to the process, as small portions. They become hard, taking a consistency entirely stony. The skin, muscles, nerves, veins, blood, &c., all undergo this wonderful change; and to effect this, it is not necessary to remove any part of the viscera. The color, forms and general characters of the parts remain the same. Offensive substances lose their smell. Putrefaction is checked at once. What is most wonderful of all, is that if the process be carried only to a given degree, the joints remain perfectly flexible. Skeletons even remain united by their own natural ligaments, which become solid although they retain their pliancy. Moisture and insects never injure them. Their volume diminishes a little; the weight remains almost the same. Hair continues firm in its place, and retains its natural appearance. Birds and fishes lose neither their feathers, membranes, scales, nor colors. The insect preserves its minutest appendage. The eyes in most animals, sparkle as in life, and from their want of motion alone would you suppose vitality extinct.

The following are some of the objects, that have been subjected to the petrifying process, and are now exhibited in the studio of Sig. Segato. One of the first of his experiments, was performed upon a Canary bird, (Fringilla Canaria, Lin.) It is still preserved unaltered, although it is now ten years since the experiment was performed; and it has been submitted to the action of water and of insects. A parrot (Psittacus aestivus, Lin.) retains its original brilliancy of plumage, unimpaired. Eggs of the land turtle, turtles, various tarantulae, a water snake, a toad, various kinds of fish, snails and insects, are in a perfect state of preservation. To these, are added various parts of the human body. A hand of a lady, who died of consumption, preserves the emaciation of the disease and of death. Another of a man is flexible in the different phalangic articulations, and yet unalterable; a foot with the nails perfectly fast, a collection of all the intestines of a child, in their natural colors and forms, with the fecal matters unremoved, the liver of a man who died from intemperance, dark and lustrous like ebony; an entire human brain with its convolutions, of extreme hardness; the skin of a woman's breast, naturally configured; a pate of a girl perfectly flexible, from which the hair hangs in curls; the head of an infant partly destroyed, and discolored by putrefaction. There is also in the cabinet of Sig. Segato, a table constructed as follows. A spheroidal surface of wood contains a parallelogram, composed of two hundred and fourteen pieces, regularly arranged. These to the eye appear like the most beautiful pietre dure that have been produced by nature. Their various colors, polish and splendor, and their surprising hardness would leave no doubt of their stony character. The sharpest file, with difficulty, makes an impression on any of them; some it does not attack at all. These species, are all portions of the human body, hardened

by this new process; as the heart, liver, pancreas, spleen, tongue, brain, arteries, etc., etc., all resembling the most highly polished precious marbles. An entire body has not yet been tried, principally on account of the limited resources of Sig. Segato, although the expense would be but about one-tenth of that of embalming by the ordinary process.

Great advantages to science, especially to natural history and human anatomy, are expected to result from this discovery; and it is even confidently believed that the remains of friends, of men of science and of worth, may be preserved for ages in the exact form and appearance, in which the hand of death found them, with nothing offensive or revolting about them.

As vouchers for the accuracy of the statements contained in the pamphlet, the certificates of many of the distinguished physicians, professors and men of science in Florence, where Sig. Segato resides, are appended. Among them, it is sufficient to mention the names of Sig. Betti, Professor of Physiology; Sig. Zannetti, Professor of Human Anatomy; and Dr. Gazzeri, Professor of Chemistry.—*American Journal of Science and Art.*

11. *Solidification of Turpentine by Magnesia.*—From M. Mialhe's experiments on copabia, and M. Faure's on turpentine, it appears that these oleo-resinous juices are most readily solidified by magnesia. The quantity of the latter, however, that is necessary to form a solid mass varies in using different species of turpentine. In this respect there is a marked difference between the common turpentines, such as those of Bordeaux, and the fine sorts, such as the Venetian, which require a much greater quantity than the former. M. Mouchon found that an ounce of Briançon turpentine mixed with an ounce of hydrocarbonate of magnesia, formed a pilular mass, which was a long time before it hardened even a little, and the pills made from which soon loose their globular form.

An ounce of Bordeau turpentine, with six drachms one scruple of hydrocarbonated magnesia, makes pills which harden very slowly, but eventually become pulverulent.

An ounce of Bordeaux turpentine and eight grains of oxide of magnesium, procured by intense calcination, gives a very soft mass, which does not take on a pilular consistence before thirty-six hours. After a few days it resists, in a slight degree, the impress of the fingers, but is truly fragile for a long time. By augmenting the quantity of magnesia, the hardening of the mass takes place more promptly; but to have pills consistent in a few minutes, and to have a magistral preparation, the proportion of magnesia must be increased to a 50th. Pills thus made are pulverulent in forty-eight hours, are transparent, and have a vitreous fracture.

These facts and experiments of M. Faure, repeated by M. M. Guibourt, Lecanu, and Blandeau, lead to the following practical conclusions:—

1. *Carbonated* magnesia should be preferred and employed in equal proportion to solidify Briançon turpentine.

2. When the turpentine of the *Pinus abies* is to be rendered solid, *calcined* magnesia is preferable.

3. The proportions of both should be smaller according to the length of time since the turpentine was collected.

4. In acting on the turpentine of the Pinus abies, reduced by time to a medium consistence, the solidification is effected in thirty-six hours, by means of a fraction of oxide of magnesium equivalent to about 1-72 of the mass.—*Journal de Chimie Med. July*, 1834.—*Amer. Jour. of the Med. Sciences, February*, 1836.

12. *Diabetes Mellitus cured by Kresote.*—Professor BRENDT, having been unsuccessful in his treatment of seven cases of Diabetes mellitus, by the various methods recommended by authors, was induced to try in the eighth, the kresote. The following are the particulars of this case, as given in *Kleinert's Repertorium* for 1835.

The patient was a man, fifty years of age, ill for the last sixteen months; he passed daily seven Berlin quarts of turbid urine, sweet to the taste and smell, and containing a good deal of sugar; the patient was feeble, his appetite very great, and he was tormented by constant thirst; his sleep was disturbed by the frequent necessity of making water, but he had no hectic fever. The treatment was commenced by administering a vomit, which brought away some acid-smelling matters. Rollo's plan of treatment was then employed for some days, and ipecacuanha was given in small doses; this produced no good effect, and instead of the ipecacuanha, eight drops of kreosote were administered in the form of pill every day. The quantity of urine now excreted diminished to three, two and a half, and two quarts per day. It appeared at first to contain a large proportion of alkalies, particularly ammonia, and remained troubled. The dose of the kreosote was gradually increased, and after three weeks Rollo's regimen was abandoned on account of the disgust it excited in the patient. At this time the urine gave the odor of horse's urine, contained less sugar, and exhibited the first traces of urea, though it continued still turbid. Under the common diet and increased doses of kreosote, the urine diminished to two or one quart and a half; it was occasionally clear, gave an acid reaction; the quantity of sugar became daily less, and that of urea greater. After some time the patient's state was evidently improved. He now took twenty-four drops a day, his appetite was good, and his thirst much less, and the urine flowed at from one and a quarter to one quart and three quarters per day. In a few days more it assumed a natural color, contained all the ingredients of normal urine, and ceased to give any trace of sugar. —*Ibid.*—*Ibid.*

13. *On Tic Douloureux.* By WILLIAM STOKES, M. D.—This is one of the most melancholy and harrassing affections to which the human frame is liable; in some instances, the poor sufferer, after having lived for years in a state of exquisite misery, is at last worn out by the intensity and persistence of his agonies. Such was the fate of the late celebrated but unfortunate Dr. Pemberton. A great deal of light has been thrown on the nature of this affection by the researches of Sir Charles Bell. He seems to have succeeded in establishing several points connected with the nature and seat of this affection, one of the most important of which is that the seat of this disease is in the sentient branches of the fifth pair of nerves, and not,

as has been supposed, in the portia dura. He has shown pretty clearly that the portia dura is the nerve which regulates the muscular motions of the face, producing all those modifications of features which we call expression, and also peculiar motions or changes connected with certain states of respiration, in a word, that it is the expressive and respiratory nerve of the face. It is, according to him, never the seat of tic doloureux, and the practice of dividing it for this complaint, is as unscientific as unsuccessful. The division of the portia dura in such cases, not only fails in giving relief, but also entails disgrace on the practitioner, and disfigurement and misery on the patient. *Its effect is paralysis of the muscles of one side of the face, and great distortion*, without the slightest relief. Yet it is a melancholy fact that such operations have been performed. Sir C. Bell's researches, however, have put an end to this malpractice, for he has shown that the fifth nerve is that which supplies the face with sensation, and that it is in its branches the disease is situated. We are then, I think, to look upon this disease as a neurosis situated in the expansions of the facial branches of the fifth pair of nerves. Sir C. Bell relates a very remarkable case, in which the patient had suffered from a series of dreadful attacks, the pain coming on in violent paroxysms. From the accounts given by this patient, and from personal observation, he says, that one could trace with anatomical precision the course and direction of the branches of the fifth nerve, for on the recurrence of an attack of pain, he applied his fingers to his face, and made pressure on the foramina where the different branches of the fifth nerve issue. Having done this, he would press the nerves with all his force, and remain in a fixed posture while the paroxysm continued.

Sir Charles Bell's idea with respect to the cause of this disease, is, that it generally depends on some visceral irritation reflected through the sentient branches of the fifth pair of nerves.

I have told you that this disease is one of the most melancholy affections to which man is subject, it is also one of the most obstinate. A vast number of remedies have been employed or proposed for its treatment, and this affords an illustration of the fact, that the more incurable a disease is, the more extensive is the list of its remedies. A few only are deserving of attention, and these I have already mentioned when speaking of hemicrania, namely, the preparations of arsenic, iron, quinine, and opium. Where these fail after a full trial, Dr. Bright looks upon the case as hopeless. Narcotics in every form and of every description have been employed both externally and internally, but to all these the same remark applies; many of these remedies will give temporary relief, and the physician will flatter himself on the prospect of a favorable termination, but in a short time he is annoyed at finding that the disease has returned and left the patient as bad as ever. Many a time have I seen a poor sufferer excited by hope on receiving temporary alleviation from the use of arsenic or iron, and sinking into despair when he found that his torturing malady returned, and that the remedies which on the first trial gave relief, on a second proved useless. The general principles which should guide you in your treatment are, first, to investigate carefully whether any visceral irritation exists, and remove it as far as possible, taking care at the same time to improve the general

state of the patient's health, and the next thing is to allay the sensibility of the nerves of the part, and avoid the exciting causes. In certain cases this disease appears to be connected with an affection of the brain, and this seems to be an explanation of the fact before mentioned, that in some cases, where all specific treatment had completely failed, relief has been obtained by shaving the head and applying ice to the scalp during the paroxysms. I have already mentioned to you a case in which this mode of treatment proved eminently successful. This is a curious fact, and one which being of practical importance, you should hold in memory.—*London Med. and Surg. Journal, Sept.* 27, 1834.—*Ibid.*

14. *Digitalis a specific for Delirium Tremens.*—Dr. Cless, of Wurtemberg states, that he has found digitalis purpurea to be specific in the treatment of delirium tremens. Of 13 cases of this disease, in which he administered the remedy, all but two recovered; these two had a relapse. The digitalis was given in strong infusion, in doses of a spoonful every two hours. After symptoms of narcotism have made their appearance, recovery ensues.—*Med. Correspond. Blatt and Gaz. des Hopitaux.—Ibid.*

15. *Pulmonary Hæmorrhage treated with Ergot.* By Dr. Durante de Caserta.—A child, aged 12 years, of sanguine temperament, good constitution. but already in the habit of drinking wine, was attacked with colic. His father, without the advice of a physician, gave him an emetic, and, during his efforts in vomiting, copious hæmoptysis took place. Dr. Durante was called to visit the patient, and found him in the following condition: face flushed; expectoration of floculent blood when coughing; pulse high and febrile. The doctor ordered a copious venesection and iced drinks, acidulated with mineral acids, to arrest the hæmorrhage. These remedies were successful, but on the following day the hæmorrhage was renewed with much greater severity, and it returned at every attack of coughing; alternating with epistaxis. M. Durante then prescribed half a drachm of the powdered ergot, to be divided into six doses, one to be administered every two hours. After this medicine had been taken, the hæmorrhage stopped, and did not return, the pulse abated and in a short time there only remained the symptoms of the catarrhal affection. Another dose of ergot was administered to ensure the cure; then some purgative medicine, cooling drinks, and an opiate at night rendered the cure complete.—*Ibid.*

II.—ORIGINAL.

THE WESTERN JOURNAL.

E Sylvis Nuncius.

CINCINNATI, APRIL 1st, 1836.

I. — Medical History of the West.

Many years since, the Editor of this Journal announced to the profession of the West, the intention of attempting to write a book on its Medical Topography, Climate and Diseases. After having formed this design, a variety of causes, successively, arose, to occasion a delay, that was as little anticipated by himself, as it could have been by those professional friends to whom he then communicated his intention. It would be useless to go into an enumeration of these sinister causes; but many of his readers will *guess*, that most of them grew out of the difficulties which, for many years, beset him as a public teacher. These difficulties he is happy to say are at length overcome, and he is now left free to prosecute an object, which seems to him of importance to the profession; but of such magnitude, as to render his success in its execution, after the *loss* of so many years, extremely doubtful. Nevertheless he is resolved to make the experiment; and, for collecting the

requisite materials, intends to resort to traveling as the only mode on which reliance can be placed. By visiting the principal localities on the great platform, between the Lakes and the Gulph of Mexico, several important acquisitions can be made, either by direct personal observation, or by intercourse with gentlemen resident in different places. The former will consist chiefly of remarks on the Medical, Geology and Topography of those localities,—the latter, of accumulated information on the different climates and the various modifications of disease, which belong to particular places.

It is the intention of the EDITOR, to devote most of the two ensuing vacations of the *Medical Department* of the CINCINNATI COLLEGE, to this object; and that such of his readers, as reside on or near the route which he proposes to travel the *ensuing* summer, may prepare to give him such aid, as the importance of the object in which he is engaged may, in their opinion, call upon them to afford, he will here state its general direction, and enumerate the principal places which he expects to visit.

Leaving Cincinnati about the middle of May, he will pass through Madison, New Albany, Bloomington, and Terre Haute, in the state of Indiana; and thence by Vandalia and Lebanon, across the state of Illinois to St. Louis: Visiting some of the adjoining localities in the eastern part of Missouri, he intends to proceed to North Alabama, and ascending the Tennessee river, to visit Huntsville, Tuscumbia and Florence: Thence he will pass to Nashville, and traversing the state of Tennessee, proposes to reach Knoxville by the Fourth of July: Leaving that place for the north, he will pass from the Cumberland Gap to Maysville, in the state of Kentucky, when ascending the Ohio to Marietta, he will proceed to Athens, Zanesville, Granville, Newark, Lancaster, Columbus and Chillicothe, and other intermediate towns in Ohio, on his return to Cincinnati.

To all medical and other scientific gentlemen, residing on this extended route, and, especially to those who have been his pupils, or who are now the patrons of this Journal, the EDITOR would earnestly and respectfully address the request, that they

will prepare themselves to afford him whatever aid may be in their power, in reference to the great object of his journey. All of them are capable of contributing to the proposed work, and all may be benefited by its execution. Let us show the truth of this remark, by an example. Autumnal Remittent Fever prevails from the shores of the Lakes to the Delta of the Mississippi, through many different climates, and over a still greater variety of soils and aspects. That it receives from these causes, as well as from the habits of the people, a great number of modifications, cannot be doubted; and no physician can hesitate to believe, that a knowledge of them, would be important to him in practice. This knowledge he cannot at present, acquire, for but few practitioners have published their observations, and these are scattered through different journals, many of which are not attainable by the majority of our physicians. Similar remarks might be made of various other interesting maladies; but the Editor believes, that enough has been said, to indicate the plan and object of the proposed work, and to awaken in all whom he addresses, a favorable anticipation of its value, provided it should be executed in a proper manner, and composed of such materials, as *may* be contributed by the physicians of the Valleys of the Mississippi and the Lakes. In respectfully asking them to place in his hands the results of their experience, the Editor desires to give this public pledge to his brethren, that he will regard it as a point of duty and honor, to preserve the name of every contributor in connexion with his contribution, so that each shall have justice done to him, while the reader will know on what authority the facts placed before him rest. Thus it will be a book *from* the physicians of the West, addressed *to* the physicians of the West;—a work of reciprocal instruction—somewhat novel in the manner in which it is gotten up—limited to the diseases of the region of which it professes to treat—not dependent on the written archives of the profession for its facts, but copious in its acquisitions from cotemporary observers.

Of the pathological and therapeutic principles, with which the author will seek to imbue this history of the diseases of the West and South, he need only say, they will be substantially the same which he taught in Transylvania University, from 1823 to 1827, and at present teaches in the Cincinnati College. These are not the doctrines of any existing or preceding sect, but a selection from all the schools, without either an ambition or affectation of originality.

To render a work of this kind really valuable, it is important that on many subjects, the different contributors should be animated by the same spirit of inquiry, and make their observations, simultaneously, on some common plan. To bring this about, the Editor, begs leave to enumerate a few topics, of greatest interest.

1. All sketches of Medical Geology and Topography, should embrace, a notice of the nature of the rocks beneath, and of the soil that covers them; the composition and temperature of the springs and wells; the relative proportions of dry land, ponds, marshes and running waters; the predominant vegetable productions; the comparative elevations of plains and hills; and the actual elevation of both, above the level of the Lakes or the Gulf of Mexico.

2. Observations on the different Climates, should present the temperature of the morning, at or before sun rise, and of the afternoon between two and three o'clock; also, that of the night, in periods of summer epidemic diseases; and at all seasons of the year, any remarkable changes from heat to cold, or *vice versa*. The states of the Barometer in the morning and afternoon, should be recorded in connexion with those of the Thermometer. The daily courses and variations of the wind, should be noticed at least twice, likewise the degree of obscuration or cloudiness of the atmosphere. The number of foggy mornings should be recorded, and the number of days of rain and snow, with general remarks on their quantity, when the observer is destitute of a rain guage. The electrical states of the atmosphere should receive especial atten-

tion; and every fact that can indicate the influence of thunder storms, and hurricanes on the health of the people, or on existing epidemics should be carefully recorded.

3. In connexion with the meteorological observations, some account should be given of the progress of vegetation; the health and diseases of plants; the appearance or absence of insects, and the diseases of domestic animals. In the same connexion might be placed, all remarks on the uncommon or prejudicial effects of different kinds of vegetable food, as indicating either a change in their qualities, or in the susceptibilities of man.

4. As diseases multiply in number, or undergo modifications of character, with the progress of society, a new country, where the population is still increasing in density, and new studies, arts, occupations, modes of living, fashions and manners, are successively introduced, presents an excellent opportunity for estimating their *modus operandi* and influence on the health of the people, and every physician should, therefore, be observant of their effects.

5. Closely related to these observations, are those on the peculiar temperaments and diseases of different classes of individuals, as the Anglo-American, the Creole, the Indian and the Negro; and all those whose occupations and pursuits are of a kind, that establish an idiosyncracy of *caste*.

6. The migratory disposition of the American people, and their distant removals into new climates and localities, furnish excellent opportunities in the West, for noting many important facts relative to acclimation, from a comparison of which, some valuable practical deductions might perhaps be made.

7. Our endemic summer and autumnal diseases, are well known to assume different characters, and to require variations of treatment in successive years. A faithful observation of these varieties, with a statement of all the physical circumstances which may be presumed to operate in their production, might at length, afford a solution of some difficult questions in their history.

8. The causes of the appearance and disappearance of epidemic diseases, and of the modifications which they undergo, would perhaps be illustrated, by simultaneous observations at different places, continued through a series of years.

9. Our endemic and epidemic diseases, although apparently originating in very different causes, are frequently observed to commingle in such manner, as, reciprocally, to modify each other, and every fact on this subject deserves to be recorded.

10. The relative prevalence of pulmonary consumption in the different latitudes and localities between the Lakes and the Gulph, should be ascertained.

11. Among the diseases of the West, dyspepsia and chronic hepatitis, hold in reference to their frequency, important places, and their causes and cure, do not seem to be well understood.

12. Neuralgias are common affections in the West; and additional inquiries into their supposed origin are necessary.

13. Ophthalmia is a western endemic, of which it would be interesting to discover the cause. Many facts seem to show that it arises from the same source as our autumnal fevers.

14. Finally, as the medical history of a country should embrace every thing that relates to the prominent and prevalent diseases of its people, a multitude of topics, in addition to the foregoing, should fix the attention of the contributors to such a work; and scarcely any fact, could be furnished, that would not find an appropriate place in the treatise.

As a considerable time will be required for the collection and arrangement, in connexion with his own, of these facts, the Editor proposes to give publicity in the Western Journal to any of them, that seem to be of immediate and special interest; and afterwards employ them as elements, in the work for which they are solicited.

To complete his researches, the Editor proposes to devote the spring and summer of 1837, to a second tour, exterior to that of the present year. It will embrace, Louisiana, Alabama,

Mississippi and Arkansas, to the south, and the basin of the Lakes to the north. To such of the readers of this Journal, as reside in the regions, then to be visited, he would at this early period, respectfully address the solicitation, that they co-operate with him in the national enterprise (if so it may be designated,) in which he is about to engage, and to the execution of which in a manner to be useful, the co-operation of his brethren of the West and South is indispensable.

II. Medical Department of the Cincinnati College.—Edifice—Trustees.

We have stated in a former number, that the Cincinnati College was chartered on the 21st of January, 1819. It was founded by citizens of Cincinnati. Several hundred contributed to the erection of its edifice. Before this was finished, from reverses of business, those who had expended liberally upon it, were compelled to withhold further contributions, and in 1825, the exercises of the College were suspended. The building went into rapid deterioration, and 10 years afterwards when the Trustees resolved on reviving education within its walls, it was almost a heap of ruins. Its bones, however, were not affected with *frangilitas* nor *caries*, and it was only necessary to restore the soft parts. A rapid regeneration of these, followed the organization of the Medical and Law Departments, but the winter came on before the work was accomplished. Suspended for several months, it has recently been resumed; and, the better to fit the edifice for the accommodation of the Medical School, a new wing 30 by 45 feet is now in the progress of erection, and will be finished by the first of June. The Faculty will then be in the occupancy of the following departments all fitted up in the most permanent and commodious manner.—1. A lecture room for the non-demonstrative branches, 30 by 42 feet: 2. An anatomical and surgical theatre of the same size: 3. A chemical amphitheatre, of equal dimensions: 4. A laboratory 24 by 30 feet: 5. An anatomical museum of the same dimensions:

6. A dissecting room 30 by 45 feet, with sky lights, a hydrant, vault and all other conveniences. Thus, in reference to apartments, no medical institution in the Union will afford better accommodations, for any number of pupils not exceeding 300. And as to chemical apparatus, anatomical preparations—both healthy and morbid, and subjects for practical anatomy, the whole will be found ample.

The Trustees have also enclosed the grounds about the edifice, and are engaged in planting them with such species, native and exotic, as will constitute a small Botanic Garden; fitted for the illustration of the elements of the science.

After accommodating, in the amplest manner the Medical and Law Departments, the capacious and repaired edifice, will afford an adequate number of large class and recitation rooms, for another school; and the Trustees are now deliberating on the best mode of establishing a department for the education of professional Teachers, in those branches that will fit them to become instructors in the Academies and Colleges of the West.

The Board of Trustees are elected annually by the contributors to the building. It is well known, that as students of medicine came to the city last fall, they were told, that at the election in the ensuing March, the contributors would displace the Board which had established the Medical and Law Schools, and elect one that would abolish both. This was accordingly attempted. The enterprise was planned with care and caution, and, as the disclosures on the day of election demonstrated, every practical effort had been made to render it effective.

But the DESTRUCTIONISTS were utterly defeated. They numbered but *eight*—the CONSERVATIVES more than *one hundred and twenty!* Thus the contributors have sustained the Board, and sanctioned the establishment of the new departments, by an expression, that has rebuked and silenced forever, the few interested individuals, who sought the arrest and overthrow of an institution, which must rapidly advance into public favor abroad, as it already has done throughout the city.

ART. III. — MNEMONIC NOMENCLATURE,—*Applied to the Proximate, Organic Principles.* By JOHN L. RIDDELL, M. D.

The systematic method pursued in giving names to mineral compounds, so beautiful in theory, and so admirable and instructive in practice, can never be extended to the chemistry of animals and plants. Rising above the simplicity which characterizes the spontaneous combinations of lifeless elements, the organic kingdoms present us with numberless substances, marked with diversity in appearance, consistence and mechanical properties; which, though in these particulars they seemingly exhaust the endless changes of variety, are yet constituted from only three or four distinct elements of matter. The composition of most proximate principles, though definite like that of the simplest mineral, is necessarily too complex to be expressed by the ordinary mode of naming.

The factitious names in the following table, indicate not only the kinds of ultimate elements, but the precise ratio in which they are combined. Selecting the more important compounds, as those to which a star (*) is prefixed, a very short time only will be required, to associate and fix indelibly in the memory, the proposed and common names;—an acquisition which chemists, physicians, apothecaries and students in physiology, will doubtless know how to appreciate.

Since devising and applying this method of notation, I have observed that Dr. Abercrombie, in his "Enquiries concerning the intellectual powers," makes mention of the mnemonic system of M. Feinagle, for remembering dates; which is founded on a plan somewhat similar.

Elements.	*Symbols.*	*Atomic weights, or combining proportions.*
Oxygen	*o*	8
Hydrogen	*e*	1
Nitrogen	*a*	14.15
Carbon	*u*	6.12

System of Numerals.

d represents		1	*s*	—	7
l	—	2	*t*	—	8
r	—	3	*z*	—	9
m	—	4	*i*	—	10
v	—	5	*ii*	—	100.
p	—	6			

Rule 1. In the formation of a name, those numeral and elementary symbols referring to each other are placed side by side, the former on the left hand, the latter on the right.

Rule 2. When a numeral consonant occurs on the left hand of the numeral vowel *i*, the two letters are factors;— they are to be multiplied together. When the consonant occurs on the right hand, its value is to be added to that of the vowel.

Examples. *mi* = 40. *im* = 14. *mim* = 44. *tip* = 86. *Luro*— (oxalic acid) = two equivalents of carbon and three of oxygen.

Note. The letter *d*, when a factor, may either be prefixed or omitted, as the harmony of the syllables require.

It will be observed that the factitious names representing acids, terminate in *o*; those representing alkalies in *a*; inflammables in *u*; and most neutral bodies in *e*.

The enumeration which follows, comprises all those proximate principles, of which satisfactory analyses have yet been published. The composition indicated, will be found to correspond either perfectly or closely, with the analytical results adopted in the fifth edition of Turner's Chemistry.

CLASS I.—*Acids.*

§ 1. ACIDS CONSISTING OF OXYGEN AND CARBON.

Luro—oxalic acid
Muro—mellitic
Vumo—croconic
Vupo—amylic acid.

§ 2. ACIDS COMPOSED OF OXYGEN, CARBON AND HYDROGEN.

* *Remuro*—acetic acid
Mepumo—lactic
Mulemo—malic
Luero—formic
Mulemo—citric
Diulero—pyrocitric
Mulevo—tartaric
Mulevo—racemic
Surevo—gallic
Repuro—pyrogallic
Reiluro—metagallic
Sulemo—ellagic
Dieivudio—kinic
Suleso—meconic
Ilumedio—metameconic
Ituzeto—catechucic
Mulero—succinic
Puveto—mucic
Diuzero—valerianic
Ipudipemo—rocellic
Liudipevo—camphoric
Imuvero—benzoic
Siupisevo—stearic
Siupivepo—margaric
Siuvitevo—oleic
Sediuro—phocenic acid.

§ 3. ACIDS CONTAINING NITROGEN.

Lavulero—uric acid
Aliuzepo—hippuric
Avetupo—aspartic
Lavumemo—alantoic
Ramivuiverio—indigotic
Repuraro—cyanuric
Ivurairo—carbazotic
Aludo—cyanic (not organic)
Alude—hydrocyanic acid.

CLASS II.—*Vegetable Alkalies.*

Porimuitea—morphia
Isovimultsea—narcotina
Voriulidea—codeia
Imolulidea—narceia
Oliudilea—cinchonia
**Loliudilea*—quinia
Roliudilea—aricina
Roriudipea—strychnia
Poriluditea—brucia
Porimulilea—veratria
Zorivulipea—emetia
Loriulidea—delphia.

CLASS III.—*Inflammables.*

§ 1. ETHEROID SUBSTANCES.

**Orelu*—alcohol
Ovemu—ether
Movepu—oxalic ether
Moideitu—benzoic ether
Moletu—acetic ether
Posetu—tartaric ether
Lovemu—pyroxylic spirit
Oreru—pyro-acetic spirit.

§ 2. RESINOID BODIES.

Loideimu—common resin
Lirelitu—essence of turpentine
Voireliu—oil of cloves
Loveimu—benzule
Lopeimu—oil of bitter almonds
Oteidu—caryophylline
Otediu—camphor
Oiediu—camphor from oil of peppermint
Opediu—camphor from oil of anise.

§ 3. CEROID BODIES.

Siserotilu—cetine
Sizesopizu—spermaceti
Isedoipu—ethal
Vizelosidu—cholesterine
Pirelopizu—ambreine
Pitetosizu—human fat
Pitetositu—oleine of human fat
Pisetosizu—hogslard
Pitesosizu—oleine of hogslard
Siesosiru—stearine of mutton suet
Pipesosizu—oleine of mutton suet
Romieviru—olive oil
Oideiru—beeswax.

CLASS IV.—*Neutral Bodies.*

§ 1. PRINCIPLES CONSISTING OF OXYGEN, HYDROGEN AND CARBON.

**Tozute*—cane sugar
Posupe—wheat starch
Iloivudire—potato starch
Pitopivupite—mannite
Iroimudime—gum Arabic
**Idoisudile*—lignin
Morume—ulmin
Moriulime—piperin
Olule—salicin
Mozume—meconin
Zoidumire—elatin
Rorume—glycerine.

§ 2. AZOTIZED PRINCIPLES.

Momivuivera—indigogen
Pomivuivera—indigo blue
Potetula—asparagin
Lotuvela—caffein
Loseimuda—benzamide
**Ruperora*—urea
Zeroizura—cystic oxide
Ivuidelola—caseum
**Rivulitedivora*—fibrin
Riluriledimora—gelatine
Rirurideiroma—albumen.

Inorganic binary compounds of the same elements, not embraced in the foregoing classification.

COMPOUNDS OF OXYGEN AND HYDROGEN.

Ode—water
Lode—peroxide of hydrogen.

COMPOUNDS OF OXYGEN AND NITROGEN.

§ 1. *Neutral bodies.*

Oda—nitrous oxide
Loda—nitric oxide.

§ 2. *Acids.*

Aro—hyponitrous acid
Amo—nitrous acid
Avo—nitric acid.

COMPOUNDS OF OXYGEN AND CARBON.

§ 1. *Inflammable.*

Odu—carbonic oxide.

§ 2. *Acid.*

**Ulo*—carbonic acid.

COMPOUND OF HYDROGEN AND NITROGEN.

Rea—ammonia.

COMPOUND OF HYDROGEN AND CARBON.

Leu—light carburetted hydrogen
Lelu—olefiant gas
Repu—bicarburet of hydrogen
Memu—etherine
Vemu—ethule
Vepu—naptha
Mediu—napthaline
Pedivu—paranapthaline
Tediu—camphene
Mevu—citrene.

Art. IV. — Of Metastasis of disease from the Bowels to the Brain, occasioned by Opium.

Sometime in February last, we were called to visit a child sixteen months old, which appeared te be laboring under some intestinal irritation, but before we arrived another physician had prescribed, and we departed after examining the symptoms of the disease, which we did before we were aware that the child had taken any medicine. On the night following our first visit, we were again summoned to the same patient, the first physician refusing to attend, when we found it in a state of deep coma, in which it had been for seventeen hours, apparently the result of a narcotic. We examined the medicine which had been left, and found that it contained opium, hence we concluded that too much had been administered, by mistake or otherwise, and proceeded to prescribe accordingly.— We ordered an emetic, followed by strong cathartics, with cold applications to the head, and departed. On the following morning we found that the medicine had operated well, but the coma with a slow full pulse, and little heat of the skin still remained. The pupils of the eyes presented no unnatural appearance; there was no stertor, and but little difficulty of breathing; the skin was soft, and apparently healthy, and the evacuations natural in appearance. Although the child took the breast, it could not be aroused even by the loudest noises. We ordered the warm bath, with cold water to the head, and hydrogogue cathartics. At noon the medicine had operated, and the excretions appeared healthy, but the coma still remained, and the child appeared to be in a sweet sleep. We now used the cold dash with no effect. At night we directed blisters to the head, and supperior portion of the spinal column, with repeated cathartics, in order to keep up the discharge from the bowels, as they were extremely torpid, except when under the influence of drastic cathartics. The blisters drew well, but the coma continued. Still the child was sensible to external impressions, for upon picking the skin in any part of the body, it

would immediately give evidence of feeling. It had been now three days in the situation in which we found it, with but little variation of symptoms, and no prospect of relief. We resorted to venesection, but could get no blood, except from the veins of the neck. This, however, was attended with no beneficial result. Blisters were now extensively used over the abdomen, with terebinthinate cathartics and irritating frictions to the extremities and to the spinal column, but the patient appeared still to sleep quietly. Here we requested a consultation, and Dr. Ridgey was called to our assistance.—He observed a little enlargement of the pupil of the right eye, which escaped us, but the symptoms otherwise continued the same. Sensation presented no lesion in any external part of the body. The former course of treatment was persevered in, with occasional modifications, for thirteen days, when the child died. We could not get permission to examine the body.

Several other physicians, besides the one called in consultation, saw this patient, but did not suggest any alteration in the treatment.

This case presents a singular transfer of disease, from the abdominal vicera to the brain, which no irritation on the mucous tissue could restore. When we first saw the patient, it had no symptoms of cerebral disease whatever, but on the contrary, the bowels alone were affected. They had been deranged for several weeks, before any physician was called, and it is probable that the one who first saw it, thought the disease only the result of a simple irritation, which a narcotic would at once relieve. As the discharges, however, indicated much lasion, in the hepatic vicera, mercurials should by all means have preceded or accompanied the opiates. Mercurials in our hands readily procured billious evacuations, but the irritation could not be removed from the brain.

It is worthy of remark, that we had for a long time attended on this family, and always found that opium, in any form, produced unpleasant symptoms in this child, consequently, we had always forbiden its use. This idiosyncracy may have contributed much to the results of its use, in this case, for we can-

not believe that a very great quantity had been administered. The physician left two portions, with directions that if the first failed to compose the child, in the course of a few hours, the second was to be given; but it threw the patient into a sleep in the course of two hours, from which it never awoke, although it appeared to remain easy, with no other symptom of cerebral irritation, for thirteen days. W. W.

ART. V. — GANGRENE OF THE LUNGS FOLLOWING SMALL-POX.

Some time in the month of September last, we were called to visit Mr. M'C., a wagon-maker, who had been confined for several weeks with confluent small-pox. When we first saw him the scabs were dropping off, and he appeared to be recovering from the small-pox; but he complained of pain in the left side of the thorax, which had been very severe during his entire confinement. His pulse was wiry and frequent, although the action of the heart and vessels were quite feeble, and the radial artery appeared very small. He had also been affected, from the time that the eruption began to make its appearance, with a distressing cough. He informed me that his attendant had not bled him, although he had frequently urged him to do so, alledging that his pulse was always too feeble, notwithstanding the other inflammatory symptoms ran very high. His skin was mostly dry, and his tongue much coated in the centre with red and polished edges.

We bled him sixteen ounces, and directed antimonials with resinous and mercurial cathartics. The blood did not separate well; the crassamentum being more or less dissolved in the serum, and presenting a dark and tarry appearance towards the bottom of the vessel. The pain in the breast and cough continuing, a large blister was applied over the chest on the day following the venesection. He now began to cough up large quantities of dark colored blood, which continued, notwithstanding all our attempts to arrest it, until the patient died—a week after we first saw him.

On examining the body eight hours after death, we found the heart unusually small, though healthy in appearance, and the left lung reduced, by gangrene, to a dark pulpy mass, which emitted a strong and very offensive odor. Where the pleura pulmonalis was not firmly attached to the walls of the chest it was covered with a condensed layer of coagulable lymph, which had become completely organized with a great number of vessels, filled with blood, passing through it in every direction. Indeed, it was so perfectly formed that it could be separated like other membranes from its various attachments. A specimen of this curious secondary tissue may be seen in the museum of the Cincinnati College.

The right lung was mostly healthy, although it was separated from the sides of the chest by a mass of dark colored fluid resembling that found in the left side of the thorax. No tuberculuar secretion was observed in any portion of the pulmonary organs.

This case is interesting, so far as it shows the result of a defective plan of treatment in the early periods of the disease. Had a copious venesection been resorted to, at the proper period, the life of the patient would, in all probability, have been preserved. It would be curious to learn how far the small size of the heart may have been instrumental in producing a weak pulse, and thus deceiving the first attendant. It also afforded an excellent specimen of secondary membrane, so completely formed that the vessels might have been injected, for they could be seen passing through it in every direction, by the naked eye. Portions of the broken down lung, after being reduced to a fluid mass, also entered the circulation, otherwise it could not have made its way into the adjacent parts where it was found.

We were assisted in the *post mortem* examination by professors Rives and Gross, of the Cincinnati College.

W. W.

INDEX.

	PAGE
A	
Abortion, manual assistance in	110
Age of Medical Men	319
Agents, Mechanical	225
Chemical	255
Vital	255
Amenorrheoa cured by Turpentine	506
Antispasmodics	439
Aneurismal tumors obliterated	324
Aneurism of Thoracic Aorta	344
Annelida	611
Apoplexy, pathology of	473
Diagnosis of	480
Treatment of	486
Circumstances predisposing to	479
Arteries, vital properties of	467
In Erectile tissue	325
Ascitis cured by Injections	276
Astringents	443
In Cholera	21
Autumnal Diseases in Mississippi	161
B	
Blood	541
changed by repeated bleedings	653
Disease of	278
Lesions of	67
Pleuritic coat of	ib.
Blood-letting	262
in Cholera	19
in Scarlet Fever	647
Blue Sulphur Springs	159
Brain, injury of	237
Breath	539
Breschet's operation for Hydrocele	507
C	
Camphorated ointment in Hydrocele	329
Catalogue of Ohio plants	567
Cataract cured in old age	369
Cathartics in Cholera	20
Catechu in mercurial disease	329
Charcoal in Lungs	298
Chalybeates in Dropsy	158
Cholera, anatomical characters of	81
Fantasies	13
Resuscitation of	24
Colchicum in cure of acute Rheumatism	333
Chyle	536
Cincinnati College	524
Manifesto	193
Circulation of Blood in Arteries and veins	472
vegetables	418
Club Foot	399
Consumptives Retreat	161
Contagion and Miasm, organic	401
Contractions of Urethra	464
Cough, Remarks on	666
Credulity	270
Croup cured by Sulp. Cupri	653
Crustacea	612
D	
Death of Leaves by Lead fumes	157
Delirium Tremens	678
Dew point, method of finding	162
Diabetes Melites cured by Cantharides	331
Diet	520
Digitalis, a specific for Delirium Tremens	678
Endermic, use of in Dropsy	131
Disease, self-limited	285
Diuretic Medication	461
Drake's letter to Committee	171
Doctor Julius of Prussia	369
Dropsy, cases of	131
Dura mater, Inflammation of	315
E	
Editorial Note	550
Remarks	550
Editorial and publishing arrangements	154
Editor's proposed route of travel	680
Elementary Textures of Vegetables	601
Emetics in Cholera	19
Endogenous growth	603
Epilepsy cured by Indigo	506
Epidemic Cholera, nitrate of silver in	109
Erysipelas, observations on	124
Ergot in Pulmonary Hæmorrhage	678

PAGE

Estep's case of Fistula 377
Excitants 257
Experimental Enquiry into nervous system 469
Exogenous plants 604

F

False Testimony 272
Final causes of organic action 600
Fistula of Urethra by Dr. Estep 379
Fluids of Animals modified by food 542
Food and Flesh of Animals, Relations of 535
Fracture of Radius 135
In child, accident mistaken ib.
Friends of Medical Reform, Address to 197

G

Gangrene of the Lungs following Small-Pox 692
General and Pathological Anatomy, study of 368
Geological survey 376
Getter, Mrs. Murdered 28
Greenville Epsom Springs 159

H

Hernia Strangulated 53
Radical Cure of 575
Home, Sir Everard's Piracy 353
Horner on Asiatic Cholera 81
Hot Douching in Sprains and Bruises 163
Hossack, David M. D. Obituary, 513
Human Combustion 78
Hydrophobia, case of D. Wonderly 592
Symptoms of 593
Postmortem appearances 594
Hypertrophy, muscular coat of stomach 298
Hysteria, Dr. Woodward on 41

I

Ice in Cholera 20
Inflammation of Spinal Dura mater, 137
Infusoria 608
Intermittent Fever in the West 372
Iodine 257
Itch, Remedy for 324

J

Jaundice, Cure for 324
Journal of Pharmacy 618

K

Kreosote, Facts relating to 464
Cure for Diabetes Melitus 676

L

Language, Ambiguity of 274
Lead, sheet in dressing wounds 289
Lepra Vulgaris 324
Treatment of 120

PAGE

Lesions of the Blood 57
of sensation and volition 389
Ligature for Brachial Aneurism 331
Liquor Amni, absorption of 366
Lithotomy 164
of Dr. McDowell 225
and Wounded Rectum 216
Little's Case of Siamese connexion 39

M

Maddox's Annomalous Disease 389
Malignant Pustule 662
Mammary Abcess, treatment of 122
Manual Strangulation 25
Experiments 30
Maryland Academy of Science 519
Materia Medica 248
by A. G. Thompson 426
Mechanical Functions of organization 601
Medical Cyclopædia 444
College of Ohio Reform 169
College of Louisiana 608
Lexington 610
Department of Cincinnati College 685
Experience 266
History of the West 679
Observations 375
Schools 154, 607
Society of Tennessee 77
Memoir Dupuytren 146
Memorial of Physicians of Ohio 170
Mercury 258
Mercurials in Cholera 20
Mercurial Transudation 163
Metastasis of disease from Bowels to Brain 691
Meteorology 547
Meteorological Notices by D. D. Owen 550
Miasmata in Air, and detection of 133
Miasm and Contagion 401, 526
Milk 537
secreted from Scrotum 327
sickness caused by Rhus Radicans 243
Minerals and Mineral waters Analyzed 37
Mnemonic Nomenclature 687
Mode of preserving Animal Bodies 673
Mollusca 610
Monstrosities 414
Morphia 429
Mount's Case of Strangulated Hernia 53
M'Guire's Case of Gun Shot Wound 382

N

Narcotics 426
in Cholera 20

PAGE

Necrosed Sequestrum Separated 223
Nervous Symptoms Illustrated 299
System and Irritability of Muscles 465
Nitrate of Silver in Cholera 109
in Tonsilitis 157
Nux Vomica 232

O

Operation on Tumor of Face 206
Ophthalma, treatment of 117, 122
Ophthalmia, Catarrhal 114
Catarrho—Rheumatic 116
Rheumatic 114
Os Femoris, fracture of 509
Our Periodical 521
Overton's Case of human Combustion 78
Oxygen Gas in Cholera 21

P

Pain and Constitutional Effects from Couching 368
Paralysis from disease of arterial System 490, 647
the Result of Apoplexy 488
Diagnosis of 492
Treatment of 500
Paraphlegia 494
Perspiration 539
Phrenology, Benefits of 156
Physiology of Respiration 361
By Jun. Editor 599
Physicians wanted at Sandwich Islands 165
Pneumogastric Nerve, researches on 129
Polypifera, 608
Post mortem examination in Cholera 15
Professor Jameson 371
McDowell 526
Prolapsus Ani 510
Purgatives in Typhus 294
Pulmonary Consumption 451

R

Recto Vaginal, communication 328
Refrigerants 265
Report of Committee on Med. College of Ohio 172
Report on Meteorology 552
Researches on Blood 656, 659
Rheumatic Ophthalmia 114

S

Saline Draughts 20
Scrofula 106
Secretion of Vegetables 622
Sedatives 260
Siamese connection discovered 38

PAGE

Sick Stomach 243
Silk oiled, in warm-water Dressing 328
Solidism and Humoralism 18
Sponges, propagation of 607
Statistics, Austrian 223
Stimulants in Cholera 20
Sulphate of Copper in Croup 652
Superstition 269
Syphilis cured without mercury 139

T

Tannin, action of on Salafiable bases 464
Tartrate Antimony, in large doses 130
Temperature of Air 552
Theory, False 274
Thermometer for 1828 551
Thyroid Gland Extirpated 338
Tic Doloroux 676
Tonics 440
Treatment of Syphilis without mercury 139
Tumors of the Face 205
Turpentine Solidified by Magnesia 675

U

Unskilful Surgery 202
Urine 539
Urinary calculus Lithotripsy 511

V

Vapor Baths in ocular affections 462
Vegetable Nutrition 616
Venous Injection in Cholera 20
Vessels of Plants 602
Veratrum Viride 335
Vertebrata 612

W

Western Academy of Natural Sciences 155
Western Medical Schools 607
Willoughby University 369
Winter Retreat for Consumptives 161
Woodward on Hysteria 41
Word from the Proprietors 532
Worms, Intestinal 307, 301
perforating Intestines 305
Pathology of 305
Symtoms of 308
Causes of 311
Treatment of 312
Wounds by Air and Steam Guns 102
Treatise on, by Dupuytren 97
of the heart, by Dr. Simmons 382
by incision and puncture 107
by gun powder 163

Z

Zoophytes 606